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ABSTRACT

This analysis seeks to characterize environmental education as an entity viewed from different perspectives. It discusses: (1) who is active in environmental education; (2) comparisons between formal and informal environmental education; (3) the normative model of environmental education and comparison of environmental education, as it exists, with the normative model; (4) the need for change strategies; (5) some potential change strategies; and (6) conclusions and recommendations. References are provided along with appendices containing background information on environmental education. (RE)

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RESEARCH LABORATORIES FOR THE ENGINEERING SCIENCES

SCHOOL OF ENGINEERING AND APPLIED SCIENCE

UNIVERSITY OF VIRGINIA

Charlottesville, Virginia 22901

A Report

A DESCRIPTIVE ANALYSIS OF ENVIRONMENTAL EDUCATION

Fourth Quarterly Report
Volume IX
Contract No. 300-700-4028

Submitted to:

Office of Environmental Education
Department of Health, Education and Welfare
400 Maryland Avenue, SW
FOB #6, Room 2025
Washington, DC 20202

Submitted by:

John N. Warfield
Professor

Report No. UVA/522032/EE78/113

October 1978

RESEARCH LABORATORIES FOR THE ENGINEERING SCIENCES

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DEVELOPMENT OF AN INTERPRETIVE STRUCTURAL MODEL AND STRATEGIES FOR IMPLEMENTATION BASED ON A DESCRIPTIVE AND PRESCRIPTIVE ANALYSIS OF RESOURCES FOR ENVIRONMENTAL EDUCATION/STUDIES

A DESCRIPTIVE ANALYSIS OF ENVIRONMENTAL EDUCATION

FOURTH QUARTERLY REPORT
Volume IX
Contract No. 300-700-4028

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Report No. UVA/522032/EE78/113
October 1978

FOREWORD

This report is one of several Volumes making up the Fourth Quarterly Report to the Office of Environmental Education under Contract No. 300-700-4028.

Each Volume contains descriptive materials designed to help convey briefly descriptions of yield from grants paid for through authorizations stemming from the Environmental Education Act of 1970 (as amended), and administered by the Office of Environmental Education.

To help avoid confusion in making reference to this report, all Volumes will be dated October, 1978 (which is the month in which the Fourth Quarterly Report is due). But because of the large amount of material, the need to make it available as soon as it is ready, the need to bind the material in distinct volumes each of which is convenient to use, and the need to schedule production resources so that the Volumes could be produced in sequence, the Volumes are being submitted during the period from September through December of 1978, or as soon as production resources permit.

All bibliographic references to this report will then be the same, except for the Volume number, and that will distinguish one Volume from another.

As a rule, Resource Materials Descriptions are inserted in order according to the federal grant number by year. Thus a lower-numbered grant in FY-76 would appear before a higher-numbered grant in the same year. The descriptions are separated by fiscal year of award to the extent possible, but the reader can't assume adherence to this practice. New materials are received, and new information comes along, which gets incorporated as soon as feasible. Also audio-visual materials are analyzed on a schedule separate from print materials, and they will be reported as soon as the results are in good form.

Appendices carry information concerning status and location of materials.

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PREFACE

This volume has been prepared under Contract No. 300-700-4028 with the Office of Environmental Education, Department of Health, Education and Welfare. Among other things, the contract called for "a descriptive analysis of resources for environmental education/ studies." This contract requirement has been interpreted as calling for: a descriptive analysis of the yield from six years of grant activity, made available by OEE in the form largely of final reports from grants and audio-visual materials produced as part of grant activity; and the present volume, in which an attempt is made to describe environmental education. An additional contract requirement called for recommended "strategies." It has been found convenient to couple the development and presentation of strategies with the presentation of the description of environmental education.

One of the first problems that had to be faced in developing this report was to try to characterize environmental education as an entity. It was found that no single characterization would suffice. It turned out to be convenient, even necessary, to view environmental education in different ways. In some respects, it is like an organization. And in viewing it that way, we find the thinking of management scientists to be useful. In another point of view, environmental education is a process to be shown in its sequences, and then it is seen that environmental education involves multiple organizations and individuals interacting.

From another point of view, environmental education is a set of visionary aspirations, only beginning to be partly realized.

From still another point of view, environmental education is a programmatic concern of the federal government, expressed through the establishment of the Office of Environmental Education in the Environmental Education Act of 1970 (amended in 1974).

Finally, environmental education is people in action, striving to help others learn, and striving to learn, in order to help the human race preserve itself and its surroundings, now and in the future.

Viewing environmental education from less than these five perspectives leaves out something that is vital to understanding it.

In a field as broad as environmental education, there is no expectation that this report can do justice to the field. It is our hope that the comments that return from examination of this report will help us find a way to improve upon the contents of this volume.

Finally, the reader should appreciate that this report is an interim report on the contract mentioned. Additional work remains to be done on a prescriptive analysis for environmental education. The strategies presented herein represent an interim result that will be tested, modified, and augmented in the final report on this project.

EXECUTIVE SUMMARY

A descriptive analysis of environmental education is highly sensitive to which of the various definitions is adopted as representative of it. Because a superficial definition is inadequate, a detailed normative model was prepared based on aggregating national and international expert opinion, and upon the definition that has been written into American law.

The EE Act of 1970 stresses a linkage model of environmental education. This linkage model has been augmented by the normative model.

As currently practiced, "formal" and "community" environmental education can be distinguished. This is a useful disaggregation, since there are major and useful distinctions to be made. The strengths of formal environmental education are the weaknesses of community environmental education and vice versa. By exploiting the strengths of each, and by continuing the growing interactions between these two components, environmental education will be strengthened.

The normative model of environmental education is used as a basis for its description. Comparison of environmental education with the normative model is based on four primary sources: the "Arizona Report", the yield from past OEE grants, data from Institute '78, and a report on learner readiness for EE.

Strategies for change are needed to help implement environmental education nationally, and to provide a basis for both self-renewal of OEE and for selectivity in OEE Program activities. Candidate strategies can be based on six major activity categories elaborated in the normative model: learning activities, personnel development, learning system design, planning, delivery systems and support, and evaluation.

The strategies that are selected should take into account the eight major activities in which OEE is engaged, and should represent a studied matching of what is *desirable* from a national point of view and what is *possible* when a proper division of OEE staff time is made to the eight major activities. Time phasing is a major consideration.

The general strategy that is recommended for OEE is to continue to emphasize the recently initiated technical assistance program to grantees, and to use this as a way of introducing gradual evolution in the grants program toward strengthening selected areas. To avoid discontinuities in the grants program, a limited contract activity should be continued to help illuminate the directions of change sought in the grants program. To carry out this strategy effectively, OEE should begin each fiscal year with a studied idea of how much of OEE's internal resources should be allocated to each of its major activity areas. This will help greatly to scale the extent of the grant and contract activity.

While there are a great many activities that have to continue if EE is to approach the systematic mode of operation envisaged in the normative model, several deserve special emphasis because they are so critical to the satisfactory achievement of the rest. These include the development of core themes for EE, the synthesis of educational research on methods and tools appropriate to EE, the preparation of guides for developing community EE, the development of objectives for community EE facilitator training, the facilitation of the use of EE materials and practices, the integration of outdoor education with social and behavioral principles, and the conduct of issue-oriented efforts regarding human settlements. In addition to these component efforts, there is a need for an encompassing image of EE as an educational system. This image should carry enough detail that it allows for regional adaptation throughout the nation in the light of regional issues, crisis or near-crisis conditions, and longer-term fundamental development of individuals to exist in a complex, interdependent society.

(The image of EE as a system is expected to be developed during the present contract, under the work described as "design of a regional environmental learning system (RELS)". Early implementation of this work can take place in regions where EE has achieved a foothold in providing background and experiential environmental education.)

THE NEED FOR A DESCRIPTIVE ANALYSIS

Although environmental education is an ongoing activity in the American society, it is not institutionalized and it is not entrenched. Neither is it well understood. Environmental educators complain that they are confused with "environmentalists," and that the public believes they are engaged in advocacy of environmental causes. No clear image of the environmental educator has emerged.

At state education levels, environmental education frequently is treated as a marginal activity in the formal education system.

At the federal level, environmental education has sometimes been regarded almost in a schizophrenic way, with political figures making strong statements of support for it followed by attempts to dispense with it.

The Congress has authorized large sums for environmental education, only to decide at appropriation time to provide a small fraction of what was authorized.

Agencies have argued that they are spending significant sums for environmental education, only to be told by Congressional spokespersons that none of what they are doing qualifies as environmental education.

Various groups purport to represent environmental education, but none has been strong enough to command widespread support at the national level.

The United Nations has a commitment to advance environmental education, and holds occasional conferences on the subject, so interest does go well beyond the boundaries of the United States.

Spontaneous, highly motivated groups arise in our society and seek to advance environmental education. Sensitivity to the relationship of the individual to the environment seems to have grown rapidly during the past decade. Newspaper articles regularly discuss varied environmental issues of local, state, regional, national and international importance.

Tradeoffs between environmental and economic parameters represent some of the most significant areas of national concern. These occur in decision-making related to energy with significant frequency, and also in matters involving land use, water resources, coastal zone management, and pest control, to name only a few.

Given all these things, it seems clear that there is a need for a descriptive analysis of environmental education simply to help explain what is going on in the field.

Aside from concern with the environment, there are concerns that are strictly educational in nature. There are two major justifications for educational practice. One relates to what a component of education can do for the individual human being to establish the human being as a unique person with knowledge and skills, and the capacity to survive. The other relates to what the component of education can do for the society or culture. While these components interact, they should be distinguished to help assure that a proper balance is achieved between the two.

A descriptive analysis of environmental education should help reveal what environmental education has to offer in these two areas of justification. For environmental education must compete with other kinds of education for limited time and budget, and it must make significant and unique contributions in these two areas if it is to hold a place in the educational system. For purposes of decision making relative to educational funding, it is desirable to be able to distinguish environmental education from other forms of education. Distinctions also facilitate a discussion of interactions between environmental education and education in general, and such discussions may suggest new and beneficial interactions.

Finally, given that environmental education is in a state of flux, it is desirable to describe environmental education as it is in order to be able to compare it with what it should be in order to arrive at strategies for change.

In summary, there are three reasons for doing a descriptive analysis of environmental education. These are:

a) to clarify the field in hopes that it can be discussed more rationally and be better understood

b) to assess its place in education

c) to make possible an indentification of strategies for change

An important adjunct to such an analysis would be a clarification of the resources that are available as a result of past grant and contract activities of the Office of Environmental Education.

* * * * * * * *

"Evolutionary and revolutionary methods are as old as history itself. Both are deeply implanted in assumptions that guide men. That does not necessarily mean that they are sound. Systematic development is a third approach. It does not start with acceptance or rejection of the status quo. Rather it begins with an intellectual model of what would be ideal or what "should be". The properties of this model are specified according to fundamental values, to theory and logic, empirical facts, and operating data... .

"Five specifications appear to be important for an approach based on systematic development:

1. Designing an ideal systematic model to delineate what "should be".
2. An objective appraisal of the existing empirical situation is essential.
3. Gaps and discrepancies arise through contrasting actual with ideal.
4. The ideal model is complete only when it takes into consideration all identifiable forces bearing on significant subsystems.
5. Steering, correction, and control mechanisms guide conversion from actual to ideal.

In summary, the greater the reliance on systematic development rather than on evolutionary or revolutionary approaches, the greater the likelihood of a problem-solving society capable of coping with dilemmas of development."

-- Robert R. Blake and Jane Srygley Mouton,
"A Behavioral Science Design for the Development of Society", Journ. Appl. Behavioral Science, 7, 2, 1971, 146-163.

* * * * * * * *

WHAT IS NEEDED TO DO A DESCRIPTIVE ANALYSIS?

When, in the fable, the blind men approached the elephant, none of them knew what an elephant was like. Each felt a different part of the elephant and drew an analysis from that experience. The blind men could have done much better in analyzing that particular elephant if they had been given a description of what a typical elephant looks like. They might then have compared that particular elephant set before them with the image of what a typical elephant is like. They would have done well to ask someone what was needed to analyze a particular elephant.

What is needed to do a descriptive analysis of environmental education? The most cautious answer to this might be "a variety of information from a variety of sources". Specifically, it seems that it would be very valuable to have in mind an image of what environmental education should be. Such an image can be a continual referent for purposes of making judgments about what is relatively important in a descriptive analysis and what is minor.

It is particularly fortuitous, then, that such an image has been developed. In order to develop a "normative model" for environmental education, a variety of sources was consulted for ideas concerning what environmental education should be. But the search did not stop with a simple set of statements. Rather statements were taken from the various sources and synthesized into a structure designed to reveal interaction among the numerous component activities and objectives that were identified.

Sources of elements of what environmental education should involve were the following:

a) The "Arizona Report" [1], a report on a survey of environmental education in the United States

b) The Environmental Education Act of 1970, as amended

c) The UNESCO document, a report from a United Nations meeting on environmental education [2]

d) Reports from recent grant projects sponsored by the Office of Environmental Education in 1975 and 1976 [3]

It was felt that these four sources provided sufficient variety and scope to furnish an adequate set of elements to make up environmental education.

Groups of citizens, experts on various environmental matters, students, and teachers worked with these elements over a period of several weeks (intermittently), and finally a structural model of environmental education was developed and explained [4]. This "normative model" or "map" furnishes the desired image of what environmental education should be, and thereby provides a benchmark for the descriptive analysis.

Also needed to do a descriptive analysis is a survey. However a survey was carried out not long ago and has been reported along with a set of recommendations for change [1]. This obviated the need for a national survey.

It is also beneficial to make direct contacts with the "EE community", those persons who are presently engaged in activities called "environmental education". A sense of this community is very valuable in making a descriptive analysis of environmental education.

A sense of the EE community was obtained through participation in two meetings attended by most of the OEE grantees for the years 1977 and 1978, as well as by persons engaged in environmental work as researchers or in public administration. Also some field work was done in several states, involving discussions with some of the state environmental education coordinators and others associated with environmental education and education in general.

Also needed is literature stemming from environmental education that represents what is happening. This need was amply filled by reports and products of over 600 grants and a few contracts stemming from work sponsored by the Office of Environmental Education over the past seven years. This large resource has been abstracted and reported [5], the reports themselves becoming a part of the descriptive analysis.

Even with all of the foregoing available, there is still a large body of information that could be relevant to a descriptive analysis of environmental education which has gone untapped. Yet it is believed that much of this is represented in a booklet describing EE activities of federal agencies [6], which has been examined as a part of the background work leading to this report.

One resource lies outside the field of environmental education. That is the philosophy that undergirds what goes on in American education. The philosophy is somewhat varied. It has been our view that the work of a professional philosopher is needed to provide a philosophical reference point for perceiving environmental education in the American context. Also it is often found that a person can summarize the extensive writings of a philosopher and provide a more coherent and unified statement of them than may be available from the original sources. The Steinberg book on the educational philosophy of Ralph Barton Perry [7] is believed to present the most appropriate philosophical background for environmental education in the United States. A Harvard-based philosopher, Perry stressed citizen responsibility to society as well as the importance of the individual and arrived at a balance between these two ideas that seems particularly appropriate to environmental education.

Clearly, it is beneficial to know how the American educational system is organized, and how responsibility and funds are allocated, as well as how subtle changes have taken place over the past thirty years. The greatly enhanced federal role cannot be ignored. It is fortunate that there exists a report of a recent extensive survey of federal programs supporting educational change [8], as it provides certain insights that are relevant to strategies for change that could stem, in part, from a descriptive analysis.

Finally, it is desirable to know something about learning and learning materials, from the point of view of the scientist who studies human learning from a behavioral perspective and who is concerned with effective learning procedures and how to facilitate these through materials development. A good background in these areas has been provided in a report specifically prepared for this project [9].

In summary, to do a descriptive analysis of environmental education, one needs:

- an image of what environmental education should be (a normative model)
- survey results
- a sense of the "EE community"
- representative literature from EE grants and contracts
- knowledge of activities of federal agencies
- a philosophy appropriate to environmental education
- a knowledge of how the American educational system is organized
- insight into how educational change can be brought about
- knowledge of the theory relevant to learning and learning materials

* * * * * * * * *

"...it is improbable that an organization can continue indefinitely if its goals are formulated arbitrarily, without cognizance of its relations to [its] environment. One of the requirements for survival appears to be ability to learn about [its] environment accurately enough and quickly enough to permit organizational adjustments in time to avoid extinction."

-- J. D. Thompson and W. J. McEwen,
"Organizational Goals and Environment:
Goal Setting as an Interaction Process,"
American Sociolog. Review., Feb., 1958,
23, 1, p. 23.

* * * * * * * * *

PARTITIONING ENVIRONMENTAL EDUCATION INTO TYPES

One of the overriding impressions gained from the study of environmental education is that it involves diverse images of what environmental education is. Given this situation, two alternatives are immediately apparent: either a variety of images can be set forth as alternatives, or one of the varied images can be chosen as the sole basis for this report. In considering these options, it was finally decided that it would be much more appropriate and useful to the descriptive analysis to set forth several different types of environmental education. This would be followed by an expression of a rationale for selecting one of the types for purposes of strategy development.

In setting forth the several types, it is not claimed that the bulk of what is going on in environmental education can be clearly identified with any of the types. What is claimed is that the specification of these types helps greatly to illuminate environmental education, and sharpens important distinctions.

The names given to these types will probably be controversial, since they are not really adequate. Those readers who dislike the terminology might simply prefer to use type numbers for the distinction. However, it has been decided to use the descriptive names, since they lend more interest and sharpness to the discussion.

The types are called, respectively: holistic, background, experiential, process and issue based, and issue based.

Holistic Environmental Education

Type 1 environmental education is called holistic environmental education. It is the type identified in the Congressional definition expressed in the Environmental Education Act of 1970 (as amended). Figure 1 shows the prose text of the definition of environmental education as given in the Act, and also shows a graphic that is intended to be suggestive of the prose.

Two of the most important ideas in this definition are "process" and "relation". The key to assessing whether environmental education is being carried out, in terms of this definition, is to determine whether an identifiable and effective process is being carried out that enables learners to know the kinds of relationships expressed in this definition. The kind of process suggested by the definition is a "linkage" process that enables larger knowledge structures to be synthesized from smaller ones. Integration of knowledge through a linkage process is the essence of this type of environmental education.

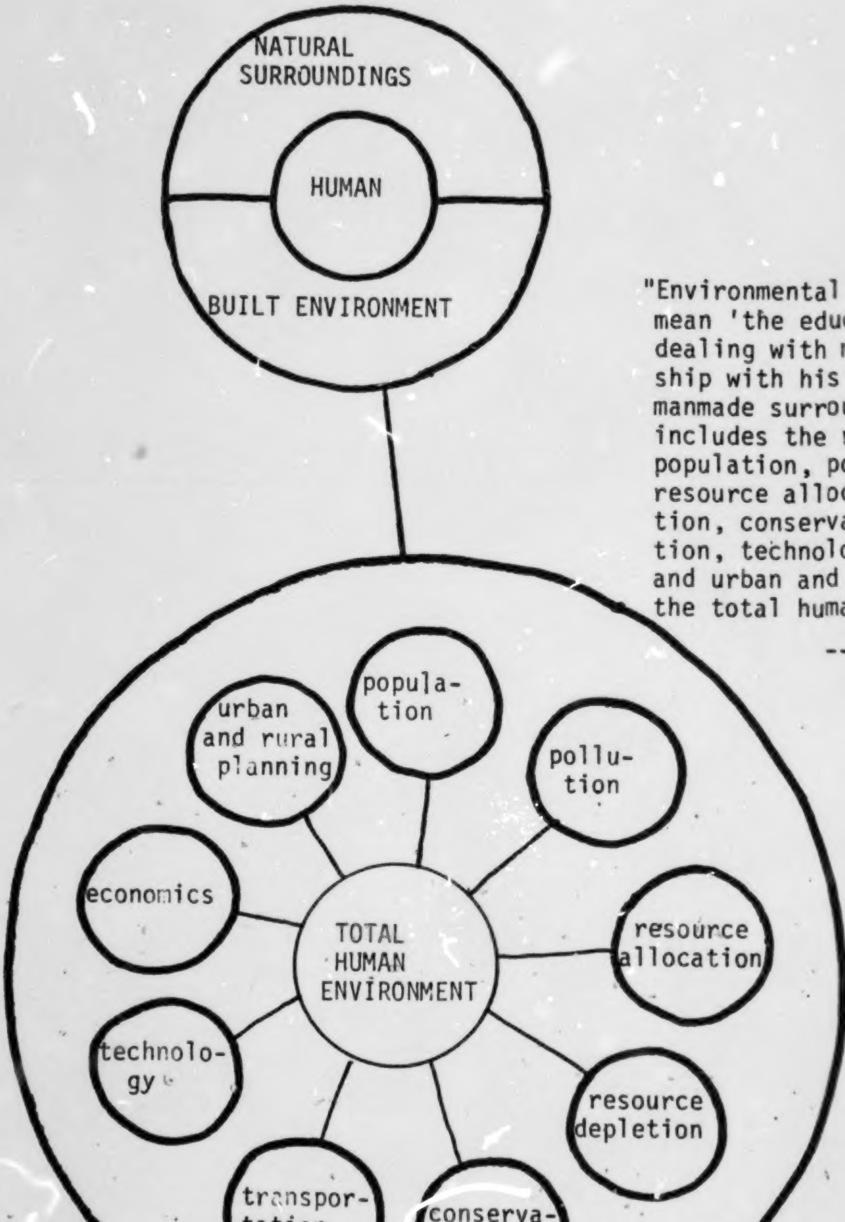
The survey carried out and reported in [1] led, unfortunately, to this conclusion:

> "In summary there is a failure at all levels for most [environmental education] organizations to truly implement an integrated theme relating to man and his relationship to natural and man-made surroundings. This suggests that proper approaches have not been available generally."
>
> -- Ref. [1], page 1.7

Two prominent concerns at the present time suggest that this conclusion is very significant to our society. These are:

a) The declining scores on college preparation tests, which Jencks [10] indicates are NOT due to any decline in knowledge of "basics", but rather is explained as follows:

> "Where today's 17-year olds run into difficulty, the National Assessment shows, is in making inferences from what they read. They know what a passage says--but they do not understand the author's point as well as their recent predecessors did."


NATURAL SURROUNDINGS
HUMAN
BUILT ENVIRONMENT
urban and rural planning
popula-tion
pollu-tion
economics
TOTAL HUMAN ENVIRONMENT
resource allocation
technolo-gy
resource depletion
transpor-tation
conserva-tion

"Environmental education shall mean 'the educational process dealing with man's relationship with his natural and manmade surroundings, and includes the relation of population, pollution, resource allocation and depletion, conservation, transportation, technology, economics, and urban and rural planning to the total human environment'."

--The EE Act of 1970, as amended.

Figure 1. A GRAPHICAL PORTRAYAL OF THE LEGAL DEFINITION OF ENVIRONMENTAL EDUCATION

J. N. Warfield
October 25, 1978

According to Jencks,

> "Today's schools ought to be trying to restore respect for the value of reason, in all its complexity."

The second concern is:

> b) The "one-issue" pressure groups, which Senator Kennedy and others have noted as a highly intensified development in our society, which threatens to make the two-party system obsolete

This phenomenon has been called "the politics of selfishness" [11], and is directly related to the individual's relative perception of the importance of individual demands versus the viability of the society, or alternatively, of inability to perceive the importance of a viable society in satisfying individual desires.

It is notable that there are very, very few forces in society that are working for a holistic component in education. There are certainly few within the education system itself, and it is concluded that attempts to bring about holistic environmental education are worthy for many reasons.

Background Environmental Education

Type 2 environmental education is characterized by emphasis upon the components (one or a few) shown in Figure 1, without emphasis upon a process for and materials aimed at learning the interrelationships among these components and building this knowledge into a larger image of the society.

For example, there might be great emphasis upon pollution, but no recognition of the tradeoffs involved with economic welfare of a community. Or there might be great emphasis upon profit making without regard for the environmental consequences of waste disposal.

There might be courses taught in the conventional disciplines that take advantage of the prevailing novelty of environmental concerns by using the term in the name, but simply presenting the older material to discuss transportation, or energy.

This Type 2 environmental education is called "background" environmental education because a substantial amount of it furnishes knowledge that would certainly be useful in a process aimed at integration of perspectives as indicated in Figure 1. Unfortunately, it is also true that almost all the basics and the disciplinary material that follows them can be considered to present valuable background. Thus Type 2 environmental education maintains a long tradition in education of presenting material and leaving it to the learner's own devices to make an effective integration, while providing no process assistance to do this extremely difficult task.

Experiential Environmental Education

How pleasant it is to argue that nature walks will provide the kind of experience needed to let the individual learner develop a holistic perspective suitable for enabling survival and effective decision making in this complex society! But survival in these times involves an intellectual wilderness that our natural wilderness does not emulate. The historical emphasis upon this kind of environmental education is substantially at odds with the Congressional definition of environmental education. The states, with few exceptions, have been impotent to erase this image of environmental education, and unable to embed it in the substantially more challenging Type 1 environmental education.

Issue-Based Environmental Education

Type 4 environmental education takes a particular issue as a focus. Perhaps it is local stream pollution, local land-use decision-making, a kepone disaster, a PPB disaster, or the damaging of housing structures caused by explosions used in strip mining.

Unfortunately, one cannot generalize much about the value of this type of education, because it depends so strongly on how well it is carried out. Clearly this type of education lends itself to mindless advocacy just as well as to studied consideration of options and their relative merits.

Process-and-Issue-Based Environmental Education

For this reason, it seems appropriate to identify Type 5 environmental education as "process and issue based" environmental education. Where the process has the attributes mentioned in the Congressional definition, this type of environmental education can approach the Type 1 holistic environmental education.

WHO IS ACTIVE IN ENVIRONMENTAL EDUCATION?

Clearly it is desirable in making a descriptive analysis of environmental education to identify who is doing what, in significant amount, and with what results.

But the answer to the question "who is active in environmental education" clearly depends on what is meant by environmental education. That is why, in the previous section, several types of environmental education were set forth.

At the federal level, a superficial answer to the question can be gained by the broad-ranging compendium prepared by Disinger [6]. This compendium is an excellent survey of what the many federal agencies say they are doing in environmental education.

Appendix F contains short "essence statements" based on [6], which describe very briefly what the 43 federal agencies identified in [6] have been doing that bears some relationship to environmental education. An extensive program is carried out by TVA, for example. None specifically indicates a strong dedication to Type 1 (holistic) environmental education, but the Office of Environmental Education has a major emphasis upon developing this type of education because of the nature of the charge in the EE Act of 1970.

Accordingly it seems appropriate to focus especially upon the "EE Community" that has related to the OEE through the grant program established by the EE Act of 1970 (as amended).

This focus would accommodate inclusion of many of the organizations that come immediately to mind when the word "environment" is mentioned, since most of them have received grants from the OEE. Included among the grantee population, for example, have been such well-known organizations as The Conservation Foundation, Zero Population Growth, The American Institute of Architects, The Girl Scouts (Milwaukee area), League of Women Voters, Sierra Club (Big Bend Group), and the Audubon Society (Maine), along with many state and local education agencies, universities, and colleges. A good way to see who is active is to scan the list of federal agencies mentioned in [6] and to look at the grantee information in the companion volumes of this report [3].

A useful way of identifying who is active in EE, for our purposes, is simply to state that those who are active generally fall into one of two major categories:

a) Formal education people

b) Community education people

Some observers have deplored this division, and urge that the two groups be drawn together. It is our opinion that this separation is logical, natural, and desirable. But because this is a particularly significant matter, it deserves a section in its own right.

Finally, we mention among those active, the Alliance for Environmental Education and the State Environmental Education Coordinators Association, most of whose members would fall into the two categories mentioned.

FORMAL AND COMMUNITY (INFORMAL) EDUCATION

The Office of Environmental Education has sponsored and conducted two significant meetings for grantees. The first, the Boulder Consultation [12], took place in the winter of 1977. It was a 2-day meeting. At this meeting, it was found that the formal education people (associated with the schools and colleges) and the community education people (not so associated, generally) had considerable difficulty in communicating with each other. The principal reason set forth was the "jargon" used by the formal education people.

The second meeting, Institute '78 [13], was a one-week meeting held at the Xerox International Learning Center in the fall of 1978. Based on the learning that took place at the first meeting, it was decided to separate the grantees into two "tracks" for the Institute, although grantees were encouraged to move back and forth between the tracks (and many did).

Our own analysis of the situation is that there are several important reasons for the separation into two distinct groups that go well beyond the "jargon" problem. The latter is somewhat superficial, since the jargon can be mastered. It is intended here to build an argument that this separation is natural, desirable, and offers needed flexibility and opportunity to environmental education. This argument will be based on both pragmatic arguments and educational philosophy, drawing some strength from both.

Comparative Analysis

The format of this analysis involves a statement of a particular dimension of comparison, followed by brief statements about how the formal and community educators tend to differ on the dimension given, as shown in Table 1.

Following this presentation, an analysis and rationale for the differences will appear.

TABLE 1

DIMENSION	FORMAL	COMMUNITY
Language	Jargon peculiar to formal education	Language of the community
Client served	Students or teachers in the school system	Community groups interested in an issue
Orientation	Theoretical, or toward materials development or teacher training	Environmental issues

[As an example, grants to community educators in 1977 and 1978 included the following issue-oriented topics:

- Use of local natural resources by Navajoes
- Stratospheric pollution by fluorocarbons
- Water for Los Angeles
- Citizen complaints as the basis for enforcement of the new strip mine law
- Values of the Suwanee River in North Florida

while grants to formal educators in the same period included the following representative topics:

- The difficulty of transforming environmental information into professional and personal behaviors
- Ecological planning for agricultural preservation
- Development of a community environmental teaching package to train teachers in organization of EE programs
- Curriculum development and implementation and teacher training in environmental issues focusing on energy

DIMENSION	FORMAL	COMMUNITY
Source Materials	Textbooks, lesson plans, modules	Regional planning documents, issue papers, media materials
Dissemination	Meeting federal standards is desirable	Media are a means of dissemination, newsletters are prominent
Stability	Institutional ties afford reasonable job security	Grant support is very important, and volunteers are often critical
Politics	That of the school board, the community, the state, and the federal government, including certification requirements	That of foundations, of the federal government, and of the pressure groups
Content	Curriculum-related, with exceptions	Issues tend to dictate content

---

In reviewing these dimensions of comparison of formal and community education, one goal of importance is to determine what is the single most compact, yet illuminating statement that can be made about the relative significance of these two approaches. This is the statement that has been developed:

> Community education offers all the benefits and disbenefits that go along with flexibility, rapid response, issue sensitivity, non-institutionalized source of learning materials, and problematic support, while formal education offers all the benefits and disbenefits that go along with institutionalization of delivery of services, an overflowing work agenda, a multiplicity of pressures for special services, slow response to changing conditions, and relative permanence of mission.

In looking at formal and community education, it seems reasonably clear that the strengths of one are the weaknesses of the other. The strategy for pursuing environmental education should, then, be designed to exploit the strengths of each, while minimizing the weaknesses of each. In general, this means that

- requirements that need to be met and sustained over a long period of time, while changing at a relatively slow rate should be met by formal education
- requirements that need to be met over a short period of time (such as one or two years, or even up to five years in some instances), while changing at a fairly rapid pace should be met by community education

As far as the content of environmental education is concerned, it is argued that

- community education should almost always be issue-oriented
- formal education should almost always be theme-oriented

In this respect, a theme would not have a limitation to a particular location or to a particular instant in history, while an issue often (but not always) would either be limited to a particular location or to a particular instant in history (the present and the immediate future) or both.

Moreover, for best results, the study of issues should have been preceded by the study of themes. And the study of themes should make use of (usually) past issues as examples to help learn the themes.

The process of carrying out environmental education is another matter to be considered. Formal education ought to be responsible for gradually evolving a process that is suitable to the linkage model of environmental education set forth in the EE Act and given in Figure 1 and the accompanying discussion.

Since it may take 10 years for formal education to arrive at such a process, and since community education has to go on in the interim, it should become a goal of community education to experiment with improved processes immediately, and to continue to improve learning processes in community education until such time as an appropriate process has evolved in formal education.

Since the Office of Environmental Education has been funding both formal and community education, and in comparable amounts, OEE is in a position where it can take these recommendations under advisement and, hopefully, use them to advantage in the grant and contract program of the Office.

The Open University

As many educators know, Great Britain has inaugurated The Open University. Sir Walter Perry, the Vice Chancellor of The Open University has remarked on education as follows [14]:

> "As initial education becomes longer, we face the prospect that our most able and intelligent young people will make no substantial contribution to society until they have almost reached middle age.
>
> "What we need is a radical change in the educational system. I believe that there must be a ruthless pruning of the content and length of initial education together with a concurrent provision of continuing education. We must not try to keep pace with the rapid acquisition of new knowledge by expanding and lengthening the curriculum of initial education, for that will only prove futile."

The concept of The Open University ought to be studied carefully and considered in some form in relation to American education, as a way of recasting the distinction between formal and community education or continuing education. But until this is done (which seems not to be imminent), our recommendations will serve within the framework that continues to be used in the United States. The costs of failure to reform the whole system are substantial.

WHAT SHOULD ENVIRONMENTAL EDUCATION BE?

It is very helpful, in attempting to describe environmental education as it is, to have in mind an image of what it should be. Probably the most effective way to conceptualize environmental education as it should be is through a set of process models, each of which fills a particular need. Two process models that might be mentioned are a programmatic process model giving a global image of a system for carrying out environmental education that would range over the variety of activities needed to do it, and a learning process model that would deal with the way in which learning takes place effectively according to the holistic environmental education or linkage model described earlier.

In this section emphasis will be on a programmatic process model which has also been called a normative model or map of environmental education. It has already been explained how the normative model was developed, and a full description of the development of it and of the model appears in [4]. Free use will be made of the contents of [4], since they are essential to the descriptive analysis.

Based on this normative model, and the discussions given earlier in this report, this section leads to a statement of critical elements that distinguish (or should distinguish) environmental education from education in general.

A Normative Model

As a part of the work on this project, a normative model for Environmental Education was developed. This model is a programmatic process model of what environmental education should be. The method of evolution of this model was described earlier. In this section, a brief description of the model is given to establish the nomenclature and set the stage for further discussion of this model in relation to strategies for EE.

The model can be described as consisting of a connected superstructure containing seven minstructures, each of which represents a distinct category relevant to EE. The superstructure appears in Figure 2., where the seven categories are displayed in relation to one another.

The reader may observe that there is nothing on this superstructure that is particularly unique to environmental education. The six kinds of activities: planning, learning systems design, personnel development, learning activities, delivery systems and support, and evaluation are related as they would be for most kinds of education.

When one examines the ministructures, environmental education is quite distinguishable. To illustrate this point, let us examine the ministructure showing learning outcomes, shown in Figure 3. (This is only one of the seven ministructures that does not use activities as the elements. The elements of learning outcomes are viewed as objectives of environmental education.)

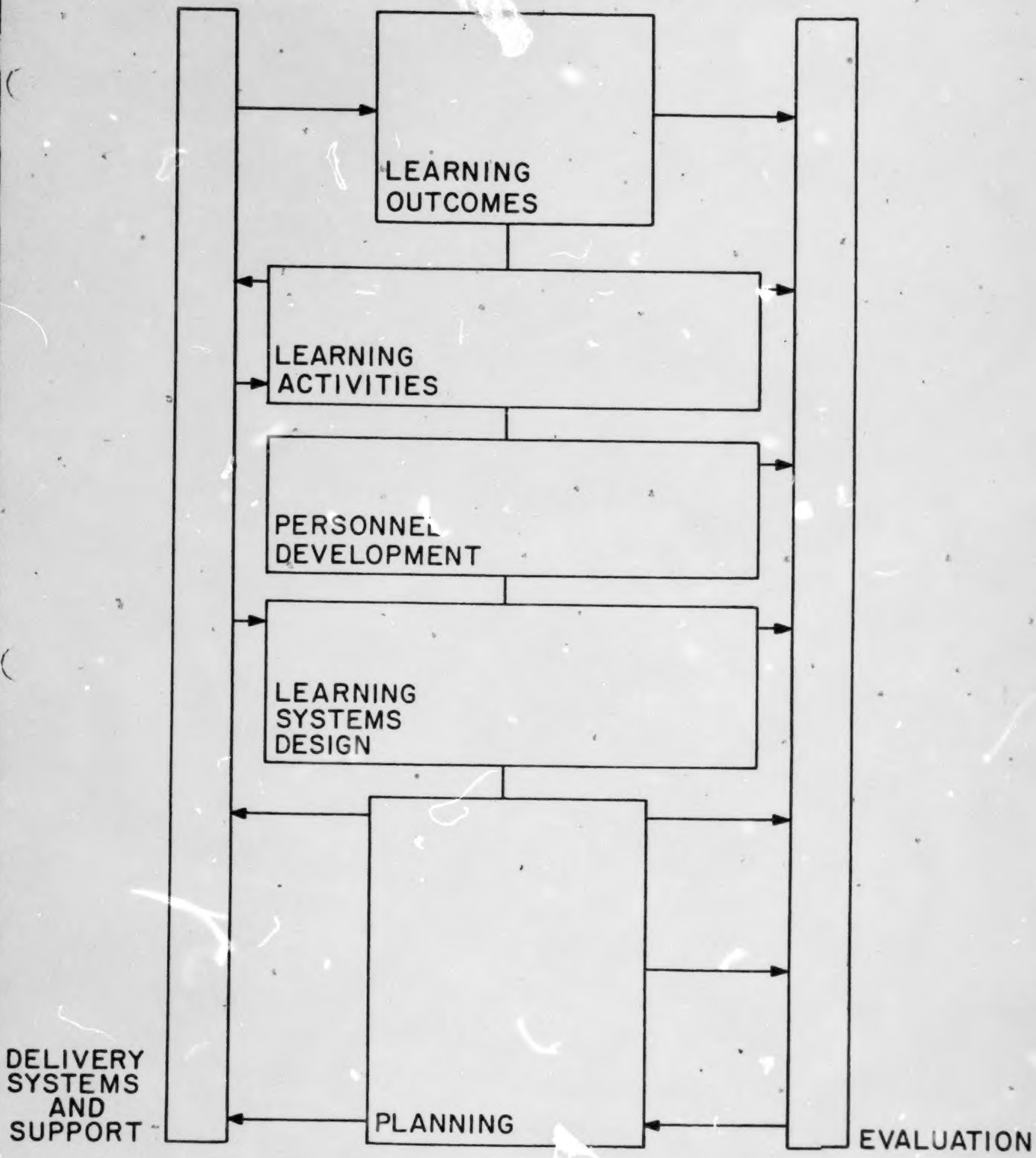

LEARNING OUTCOMES
LEARNING ACTIVITIES
PERSONNEL DEVELOPMENT
LEARNING SYSTEMS DESIGN
PLANNING
DELIVERY SYSTEMS AND SUPPORT
EVALUATION

Figure 2. Schematic of Normative Model Showing Superstructure

(The arrow represents "should help achieve".)

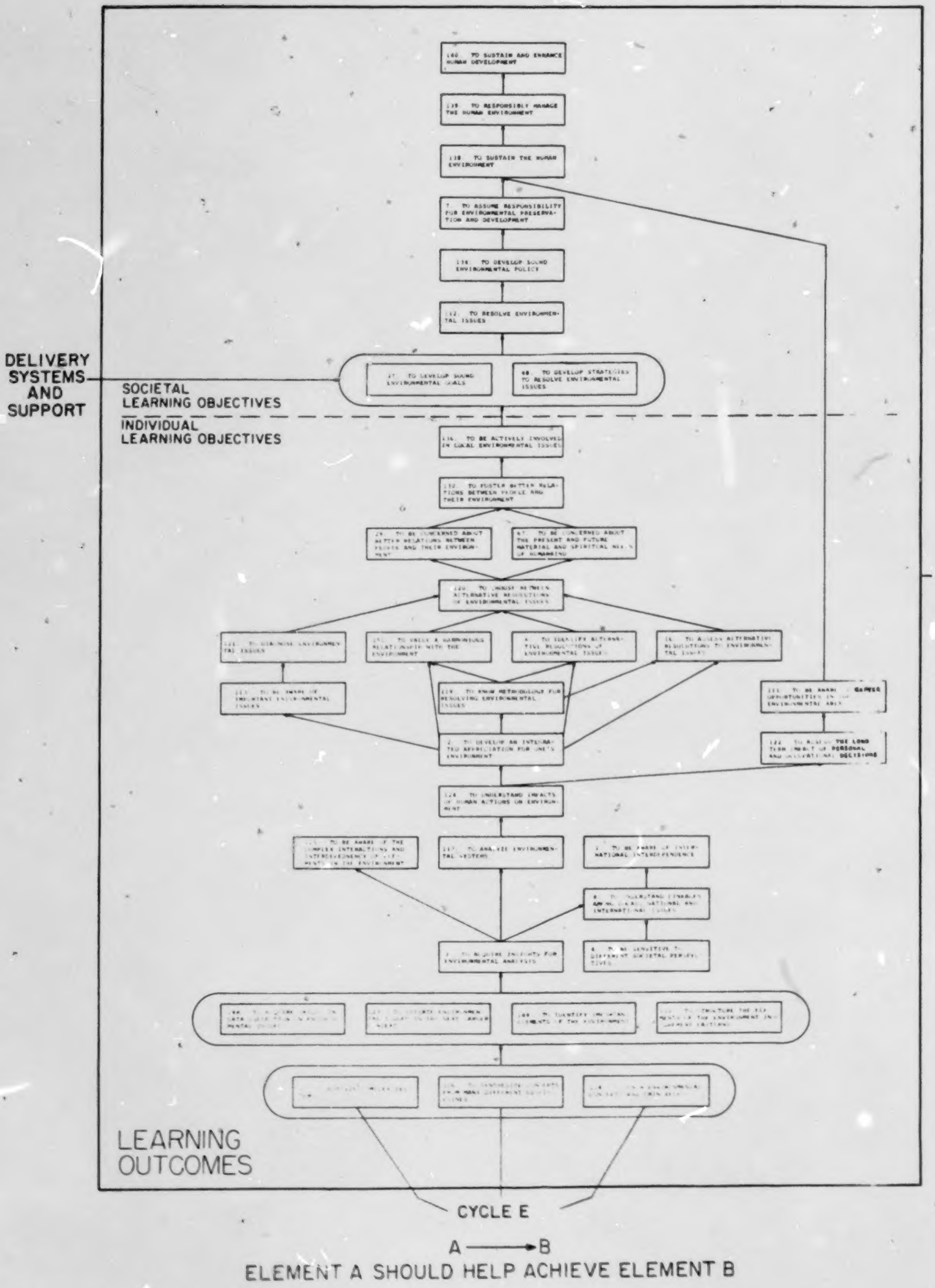

140. TO SUSTAIN AND ENHANCE HUMAN DEVELOPMENT
139. TO RESPONSIBLY MANAGE THE HUMAN ENVIRONMENT
138. TO SUSTAIN THE HUMAN ENVIRONMENT
7. TO ASSUME RESPONSIBILITY FOR ENVIRONMENTAL PRESERVATION AND DEVELOPMENT
134. TO DEVELOP SOUND ENVIRONMENTAL POLICY
112. TO RESOLVE ENVIRONMENTAL ISSUES
DELIVERY SYSTEMS AND SUPPORT
27. TO DEVELOP SOUND ENVIRONMENTAL GOALS
48. TO DEVELOP STRATEGIES TO RESOLVE ENVIRONMENTAL ISSUES
SOCIETAL LEARNING OBJECTIVES
INDIVIDUAL LEARNING OBJECTIVES
136. TO BE ACTIVELY INVOLVED IN LOCAL ENVIRONMENTAL ISSUES
132. TO FOSTER BETTER RELATIONS BETWEEN PEOPLE AND THEIR ENVIRONMENT
29. TO BE CONCERNED ABOUT BETTER RELATIONS BETWEEN PEOPLE AND THEIR ENVIRONMENT
67. TO BE CONCERNED ABOUT THE PRESENT AND FUTURE MATERIAL AND SPIRITUAL NEEDS OF HUMANKIND
120. TO CHOOSE BETWEEN ALTERNATIVE RESOLUTIONS OF ENVIRONMENTAL ISSUES
121. TO DIAGNOSE ENVIRONMENTAL ISSUES
151. TO VALUE A HARMONIOUS RELATIONSHIP WITH THE ENVIRONMENT
TO IDENTIFY ALTERNATIVE RESOLUTIONS OF ENVIRONMENTAL ISSUES
16. TO ASSESS ALTERNATIVE RESOLUTIONS TO ENVIRONMENTAL ISSUES
TO BE AWARE OF IMPORTANT ENVIRONMENTAL ISSUES
119. TO KNOW METHODOLOGY FOR RESOLVING ENVIRONMENTAL ISSUES
111. TO BE AWARE OF CAREER OPPORTUNITIES IN THE ENVIRONMENTAL AREA
2. TO DEVELOP AN INTEGRATED APPRECIATION FOR ONE'S ENVIRONMENT
122. TO ASSESS THE LONG TERM IMPACT OF PERSONAL AND OCCUPATIONAL DECISIONS
124. TO UNDERSTAND IMPACTS OF HUMAN ACTIONS ON ENVIRONMENT
TO BE AWARE OF THE COMPLEX INTERACTIONS AND INTERDEPENDENCY OF ELEMENTS IN THE ENVIRONMENT
117. TO ANALYZE ENVIRONMENTAL SYSTEMS
TO BE AWARE OF INTERNATIONAL INTERDEPENDENCE
TO UNDERSTAND LINKAGES AMONG LOCAL, NATIONAL AND INTERNATIONAL ISSUES
TO ACQUIRE INSIGHTS FOR ENVIRONMENTAL ANALYSIS
TO BE SENSITIVE TO DIFFERENT SOCIETAL PERSPECTIVES
TO IDENTIFY IMPORTANT ELEMENTS OF THE ENVIRONMENT
TO SYNTHESIZE CONCEPTS FROM MANY DIFFERENT DISCIPLINES
LEARNING OUTCOMES
CYCLE E
A → B
ELEMENT A SHOULD HELP ACHIEVE ELEMENT B

Figure 3. Structure of Learning Outcomes

(61)

One observes in Figure 3 a multilevel structure containing 36 objectives arranged in such a way that those contained in the oval enclosures are believed to be mutually reinforcing, while those that lie below others are thought to be beneficial in helping achieve the ones above them.

Here the full challenge of environmental education is displayed in terms of desired learning outcomes. These outcomes correlate closely with several of the source documents, including the EE Act and Regs, the Tbilisi document, and the Arizona Report.

It is noted that the lower two-thirds of the structure relates mostly to individual learning objectives, while the upper third relates to desired societal learning objectives. The latter can be viewed as the desired societal payoff from environmental education.

All of the activities shown in the other six ministructures (to appear later in this report) are aimed at achieving the results shown in Figure 3.

In answering what environmental education should be, the normative model indicates that in its superstructure it should have a programmatic process with the same global kinds of elements as education in general. While this may be comforting, in that the requirements of EE fit in nicely with the requirements of other types of education at the global level, it is necessary further to discuss how EE differs at the operational level.

Critical Elements that Distinguish EE from Education in General

Certain critical elements distinguish EE from education in general in a process sense. (The content distinctions will not be treated in this discussion, because we are dealing here with a programmatic process model. Other distinctions appear when the content is considered--especially in how content elements are required to be interrelated!)

Some of these critical elements are found in some other types of education. It is the total set that illustrates the special process characteristics of EE.

An especially significant element is:

1. Environmental education involves both formal education and community education.

This is not an accident of the times, but reflects real societal needs. We need formal education in EE to help prepare us better for life-long decision making in relation to our environment and our interactions with it. We need community education to help us deal with issues as they arise.

Also, at present,

2. There is a need to integrate environmental education into formal education.

We are speaking here of holistic environmental education, which has yet to make much of an inroad into formal education.

A major distinguishing feature of holistic environmental education is:

3. The process of EE is basically a linkage process, involving numerous, multiple linkages, with ramifications stemming from that.

Such a process is dependent for success upon an established knowledge base from which linkages can be perceived, and upon a process for carrying out the linking in a learning mode. In community education, it usually involves network development in order to accumulate knowledge from individuals or agencies, and to sustain the effort to do the necessary synthesis. In either case (formal or community EE), special process assistance is needed to facilitate systematic learning and linking.

With some exceptions (e.g. in Pennsylvania),

4. There is a lack of prepared teachers for EE, because of the absence of adequate teacher training programs, which is especially relevant to formal education.

In-service training continues to be needed. Training requirements also exist for community education.

With respect to materials,

5. For formal education, there is a lack of adequate instructional materials, due to a combination of factors.

Among the factors are:

- Lack of an established institutional market
- Lack of a synthesis capability among authors of EE materials
- Unawareness of what is needed for holistic EE among authors
- Inadequate dissemination of what is available and suitable

The materials need for community education also exists, but it is not as big a problem as for formal education.

Since issue-oriented efforts in EE almost always involve a data need,

6. For community education, there is a continuing need for data collection, to enable the education to proceed.

Closely related to this is the fact that

7. Community education is on-line education, that is it is functioning at the same time as the issue is of concern.

This means that community education enjoys certain motivational advantages, but it is often hard to take advantage of that motivation owing to the short time scale upon which educational materials are needed, and the non-institutionalization of sustaining resources.

Also

8. Community education seldom involves long-term institutional support (except in particular component areas), but depends on outside assistance in dealing with issues.

This is one of the reasons why a federal grant program such as that operated by OEE is particularly useful in community environmental education.

Moreover

9. Community education requires network development, and formal education certainly benefits from it.

This is an unusual requirement, and is one reason why continuing technical assistance is needed for environmental educators.

Another unusual element is that:

10. The potential exists for community EE and formal EE to benefit significantly from interactions, and this potential is recognized by the bulk of the persons who are active in these areas[19].

With almost no funding devoted to interactions of these two groups of educators, the potential for major achievements with relatively little expenditure exists.

One example of a branch of education that bears some similarity to environmental education is environmental health education. The outgrowth of disease in a community has some similarities to the outgrowth of environmental issues. Environmental health is making inroads into the curriculum, and environmental health educators have a useful background of experience relevant to community education [15,16].

COMPARISON OF ENVIRONMENTAL EDUCATION WITH THE NORMATIVE MODEL

Previously it has been asserted that there are five representative types of environmental education. These were described as holistic, background, experiential, issue-oriented, and process-and-issue oriented. Before comparing environmental education with the normative model, it is appropriate to clarify how the normative model relates to these five types.

The normative model incorporates all five types. However it is impossible to achieve the learning outcomes shown in Figure 3 if holistic environmental education is not achieved. On the other hand, if holistic environmental education is achieved, the benefits of the other four types would largely or entirely be achieved. From a learning point of view, holistic environmental education dominates the other types. At the same time, holistic environmental education is supported by the other types. Wherever environmental education is taking place, involving the other four types, this helps build a base for holistic environmental education.

If one examines the seven lowest level elements in the Learning Outcomes section of the normative model (Figure 3), it is seen that these elements present a major challenge that requires holistic education. Our analysis indicates that this challenge has yet to be met in any major way. The delivery system is not delivering holistic environmental education.

Thus in comparing environmental education with the normative map, the comparison will focus upon the six activity areas rather than the Learning Outcomes, since it is through strengthening these six areas that progress will be made.

The comparisons that will be made will be based on the Arizona study [1], the yield from grant activities supported by OEE [3], data gathered at Institute '78, and the report on learner readiness for EE developed for this project [9].

Comparison Based on the Arizona Report

The Arizona Report [1] described the results of a national survey of environmental education in the United States, and made conclusions and recommendations based on that survey and a smaller survey conducted within Arizona. The report contains a very explicit primary recommendation:

> "To develop core themes and a conceptual structure in environmental education that synthesizes and integrates pertinent subject matter across and between a variety of traditional disciplines."

According to this report,

> "the [national] data base reveals that little integration is presently taking place. Although many environmental programs at the elementary/secondary level claim man/nature interactions as a focus, the data indicate that this concept is not stressed. In non-school programs, these interactions are implicit in the raison d'etre of nearly all of these organizations. Two environmental education perspectives are particularly identified however: one is the nature study viewpoint and the other is the theme of man's adverse impact on nature."

And, to again stress the point, the report states that:

> "In summary there is a failure at all levels for most organizations to truly implement an integrative theme relating to man and his relationship to natural and man-made surroundings. This suggests that proper approaches have not been available generally."

The Arizona report thus furnishes a major basis for the conclusion set forth earlier in this section that holistic environmental education is unusual or exceptional, and that other types of environmental education are prominent in the educational system.

In the light of the comments quoted from that report it is appropriate to note that the first comment could be paraphrased to say that a curriculum should be developed for EE based upon core themes. The third quotation suggests, moreover, that the process whereby this curriculum should be used also requires development.

The second quotation draws something of a distinction between formal and community education. Here it seems desirable in comparing EE with the normative map to carry this distinction further.

A curriculum based on integrated core themes, and a suitable process for learning with such a curriculum, would be most relevant to formal education. On the other hand, it appears that community education would not be sufficiently served by developing such core themes, though community education could benefit by the process whereby core themes are learned. It appears that community education needs to be process-and-issue-based, and to work toward holistic EE from that framework.

It has often been said that environmental education should be issue-focused, but this ignores the practical realities of sustaining current educational materials that represent current issues in an accurate perspective on a time scale consistent with the mode of formal education. The goals of formal education are designed to prepare one for a protracted lifetime. Community education, on the other hand, can be process-and-issue-focused, and the limited energies available can be directed to timely data gathering and to specific interactions involved in the issue being treated. Such activities would be beneficiaries of the thematic learning from formal education. Formal education could benefit by using, as examples to make the themes realistic, results of prior experiences gained with issues treated in community education.

The critical role of core themes appears in the Planning portion of the superstructure of the normative model, where it ultimately supports the preparation of information on EE issues for public use located within the Learning Systems Design portion of the normative model.

Much of the issue information is locally or regionally collected by county, city, and regional agencies and commissions. Often such information is developed for planning purposes but does not find its way into education. If an appropriate learning system were operational in the various regions, one of its functions would be to facilitate linking such agencies, commissions, and planning information to the educational practices in the system.

Regional planning documents should prove to be useful in developing the core themes recommended in the Arizona report, but would seldom if ever be adequate developments of the core themes themselves, thus intermediate development is needed to make these documents useful in education.

Comparison Based on OEE Grant Yields

A grant is a gift from the government to a proposer, based upon an approved application, wherein the proposer describes something to be done that meets the legal requirements for a grant. It is not always proposed to develop, under a grant, something that would become available for wider use. On the other hand, some grantees do develop results that might be of interest to others, and these results can take a wide variety of forms.

> The yield from a grant refers to either a printed result such as a report, a prose learning packet, or an interactive game; or to a film, video tape, slide show, or other form of audio-visual material. The term product has been used for all material other than prose material.

Thus some grants produce a yield, and of those that do, some produce a product.

The yield from the grants sponsored by OEE in the period 1971-1976 inclusive has been described [3]. For purposes of comparison of EE as reflected in grants with the normative model description of EE, the descriptions in [3] have been used to develop "essence statements" for the 1976 grants and the 1971 grants. These statements appear, respectively, in Appendices D and E. It is intended to discuss the results of a comparison of these two grant years, to help assess movement in EE toward the holistic type of EE, and toward the kind of programmatic system represented by the normative model.

An essence statement is an attempt to capture, in as brief a way as possible, while still giving an overview of the grant activity or yield, the essence of what took place or was reported as to be done during a grant activity.

The 1976 grants have been classified according to the principal kinds of activities reported, based on the essence statements given in Appendix D. Table 2 shows the classifications of these grants. In a few cases a grant has been assigned multiple classification, but usually a grant has been assigned only to the category that seemed most accurately to represent it.

TABLE 2

ASSIGNMENT OF 1976 GRANTS TO MAJOR CATEGORIES OF ACTIVITY

1. (31 grants) Clarification of a local or regional issue.

   Grant numbers 1967, 1971, 1973, 1984, 1986, 1988, 1989, 1996, 1999, 2000, 2001, 2002, 2003, 2015, 2016, 2018, 2031, 2034, 2042, 2043, 2044, 2045, 2046, 2047, 204u, 2052, 2054, 2057, 2060, 2062, 2065

2. (22 grants) Clarification of a national issue with regional or local implications.

   Grant numbers 1969, 1975, 1978, 1979, 1980, 1981, 1983, 1985, 1987, 1993, 1998, 2013, 2017, 2021, 2033, 2038, 2050, 2053, 2055, 2059, 2061, 2064

3. (14 grants) Development of materials packets, resource kits, or films, with focus on environmental content.

   Grant numbers 1968, 1972, 1976, 1977, 1982, 2019, 2023, 2028, 2029, 2033, 2035, 2050, 2051, 2056

4. (8 grants) In-service training of teachers.

   Grant numbers 1990, 1992, 2022, 2028, 2032, 2040, 2041, 2058

5. (6 grants) Development of teacher's guide for curriculum.

   Grant numbers 1970, 1974, 1978, 2020, 2021, 2037

6. (5 grants) Design or demonstration projects.

   Grant numbers 1974, 2023, 2049, 2058, 2065

7. (4 grants) Course development.

   Grant numbers 1995, 2004, 2039, 2049.

8. (3 grants) Community educator training.

   Grant numbers 2030, 2036, 2042.

9. (2 grants) Community-School joint programs.

   Grant numbers 1991, 1997

10. (1 grant) Student environmental awareness and survival program.

    Grant number 1994.

It is relatively easy to see from Table 2 that the bulk of the 1976 grant activity can be classified as relating to clarification of national, regional, or local environmental issues. It can be expected that much of the value in this activity was produced at the site where the grant activity was carried out. The extent or quality of the educational values has not been evaluated, in most instances, according to normal standards of evaluation. One suspects, but cannot document, that much of the motivation for the grant activity lay in clarifying complex issues for local citizens. Thus the matter of yield and transferability, while important, may well have been of secondary concern to many grantees. The latter statement reflects the fact that numerous reports and products from grants did not reach the University of Virginia for analysis, suggesting that there was secondary importance attached to "yield" as we have defined it. This further suggests that selectivity in dissemination of grant yield is of considerable importance.

On the other hand, it must be kept in mind that some of the grantees have demonstrated strong interest in making available grant results to wider audiences, as indicated by their having taken steps on their own to make such results available through their own initiatives, as documented in other Volumes of the Fourth Quarterly Report.

Process and Interactions

Turning now to the issues raised in connection with the Congressional definition of environmental education, with emphasis upon process and linkages among the varous components of the environment, the grant activities can be assessed from this perspective based upon the essence statements given in Appendix D.

The amount of prominence given over to *process* among the grants examined seems to be *very small*. (Perhaps it is desirable at this point to inject what is meant here by "process." Specifically, it is being interpreted as the set of activities and the sequence of this set of activities that is used to cause environmental learning to take place.) What appears to have occurred in many instances is that no unusual attention has been given to process, but instead conventional processes such as workshops, regular classes, and seminars have been used.

With regard to interrelationships among environmental components, it seems clear from scanning the essence statements that many of the grants do involve studies of interrelationships. Some of the grants quite clearly stress interrelationships. Others *do* not appear to have demonstrated any sensitivity toward this idea. For most of the grants it is not easy to determine the emphasis placed on interrelationships, and for many it can be said that the situation under which the activity was carried out was the determining factor. That is, interrelationships may often have been brought out vicariously, rather than as a planned and stimulated occurrence.

As examples of grants that appear to have clearly emphasized interrelationships among environmental components, we may mention the following:

1975	Workshop on integrated pest control
1979	Seminar on downtown urban land use
1986	Societal impacts of flooding on the Souris River System
1991	Linkages of community education with formal education
1995	Values clarification techniques and their relevance to current environmental issues
1996	Environmental and economic concerns relating to the Coos Bay Estuary

1997	School-community project relating to the Missouri Botanical Gardens
2000	Environmental impacts of energy development in Utah
2003	County level growth and community networking
2013	Major human settlement problems
2016	Interactions of land, energy, and water use in the Sioux Basin, and other activities
2017	Workshop on "Jobs and Energy"
2025	Environmental health in an ecological perspective

Still others could be mentioned, but this is a representative list.

The 1971 grants, likewise, have been classified according to the principal kinds of activities reported, based on the essence statements given in Appendix E. Table 3 shows the classification of these grants.

TABLE 3
ASSIGNMENT OF 1971 GRANTS TO MAJOR CATEGORIES OF ACTIVITY

1. (29 grants) Community or student awareness and training.

   Grant numbers 4577, 4586, 4587, 4588, 4591, 4592, 4593, 4597, 4598, 4601, 4602, 4609, 4610, 4618, 4619, 4620, 4627, 4628, 4631, 4633, 4636, 4639, 4783, 4574, 4578, 4613, 4634, 4637, 4782

2. (9 grants) Discussion and curriculum guides.

   Grant numbers 4587, 4589, 4596, 4620, 4621, 4622, 4623, 4581, 4607

3. (7 grants) Preparation of bibliographies, resource lists, taped lectures, newsletters, slide presentations and films.

   Grant numbers 4569, 4570, 4584, 4614, 4615, 4616, 4625

4. (6 grants) Development of environmental teaching centers (with and without field trips)

   Grant numbers 4575, 4624, 4576, 4595, 4605, 4611

5. (6 grants) Introduction of new courses.

   Grant numbers 4606, 4620, 4630, 4632, 4635, 4578

6. (5 grants) Student projects.

   Grant numbers 4582, 4583, 4617, 4572, 4600

7. (4 grants) Development of state master plans for EE.

   Grant numbers 4579, 4604, 4638, 4608

8. (3 grants) Teacher training conference or workshop.

   Grant numbers 4580, 4603, 4612

9. (3 grants) Leadership training.

   Grant numbers 4568, 4573, 4585

10. (2 grants) Surveys or survey methods.

    Grant numbers 4590, 4594

11. (1 grant) Environmental problem identification.

    Grant number 4599

12. (1 grant) Clarification of a regional issue.

    Grant number 4829

It seems clear to us, based on comparisons of Table 2 and Table 3, that the 1971 grants were largely striving to get community and student awareness of the environment, while by 1976 much more effort was being devoted to issues. This indicates that substantial progress was made between 1971 and 1976 in moving in the direction requested by the EE Act of 1970. At the same time it suggests that the country was certainly not ready to accept the challenge of the EE Act (and the grants indicate that the Act was not even understood by most of the applicants) in 1971. On the other hand, it does seem that there is a much better understanding now of what the Act was aiming at, and that comparable progress during the next 6 years would likely increase still more the efficacy of the program spawned by that Act.

While the examination of the 1976 grant descriptions does present a favorable impression with respect to the study of interactions in the environment, the absence of process description and sensitivity and the lack of evaluation makes it impossible at this time to assess the learning that took place, the retention of what was learned, and the ability to apply what was learned. This is a regrettable and serious defect which no amount of analysis of available materials can correct.

The actions of the Office of Environmental Education in increasing the level of technical assistance, and in providing technical help with regard to how to do evaluation of projects, as carried out in the Boulder Consultation (1977) and the Institute '78 (Leesburg, Virginia, at the Xerox International Learning Center) are very laudable as steps to help correct the deficiency. The results of this effort are likely to make a modest impact on the reporting of the 1977 grants. As knowledge of evaluation grows in the environmental education community, it seems likely that allocation of part of the grant budget to evaluation will become more prominent, and that evaluation results will begin to appear.

Dissemination

In a descriptive analysis, one may simply observe that the majority of the dissemination of grant yield that has taken place has been at the initiative of the grantee. It is our understanding that OEE is working to take advantage of established dissemination channels in the future. It sounds easy to disseminate materials, but numerous bureaucratic obstacles make the process time-consuming and difficult. The environmental field being complex, it also involves unusual considerations relating to definitions, transferability of results from one region to another, and the high verbal content of grant activity in the numerous workshops which makes capturing of results expensive, laborious, and problematical.

Yields Deserving Special Mention, in Relation to Holistic EE

While the primary recommendation given in the Arizona report appears to be far from satisfied, some of the grant yields can be mentioned as showing considerable progress in that direction.

One of the EE grant products, a report on "integrated pest management" demonstrates an excellent example of how an environmental issue can be treated from a linkage perspective [17].

Another, involving the development of a teacher training model based on energy flow (one of the five core themes suggested in the Arizona report) is described briefly in Appendix A. This model was developed partly through a grant and partly through a contract.

Some of the film or video tape products that approach a holistic type of environmental education are described in another volume of this report [3].

Analysis of Data Gathered at Institute '78

While attending Institute '78, a gathering at which many of the 1977 and 1978 grantees of the Office of Environmental Education were present, the participants were asked to furnish some information about their grants as they related to the normative model. The form used for gathering the data is shown on page 19, Appendix A. A total of 45 responses was achieved, out of 111 in the group, for about a 40% return, but one response was received too late for inclusion in the analysis that follows.

Locating Individual Grants in the Superstructure: Grantees were asked to identify which of the seven categories shown in the superstructure (Figure 2) their grant activity appeared to lie within, given the entire normative model showing all the details of the elements. Of those responding, more (78%) said they were involved in "learning activities" than in any other category, and fewer (20%) said they were involved in "planning" than in any other activity. A bar chart of the responses by percentage of respondents appears in Figure 4.

The number of individual boxes checked by each respondent is called the "dispersion" of the grant. The maximum value of dispersion would be 7 (there are 7 categories in Figure 2), and the minimum value is 1. The average dispersion was about 3 for the respondents. Three grantees said they were working in all 7 categories on the superstructure, and 10 said they were working in only 1 category.

Variety of Activity for a Grant: The variety of activity for a grant has been defined as the number of elements from the normative map

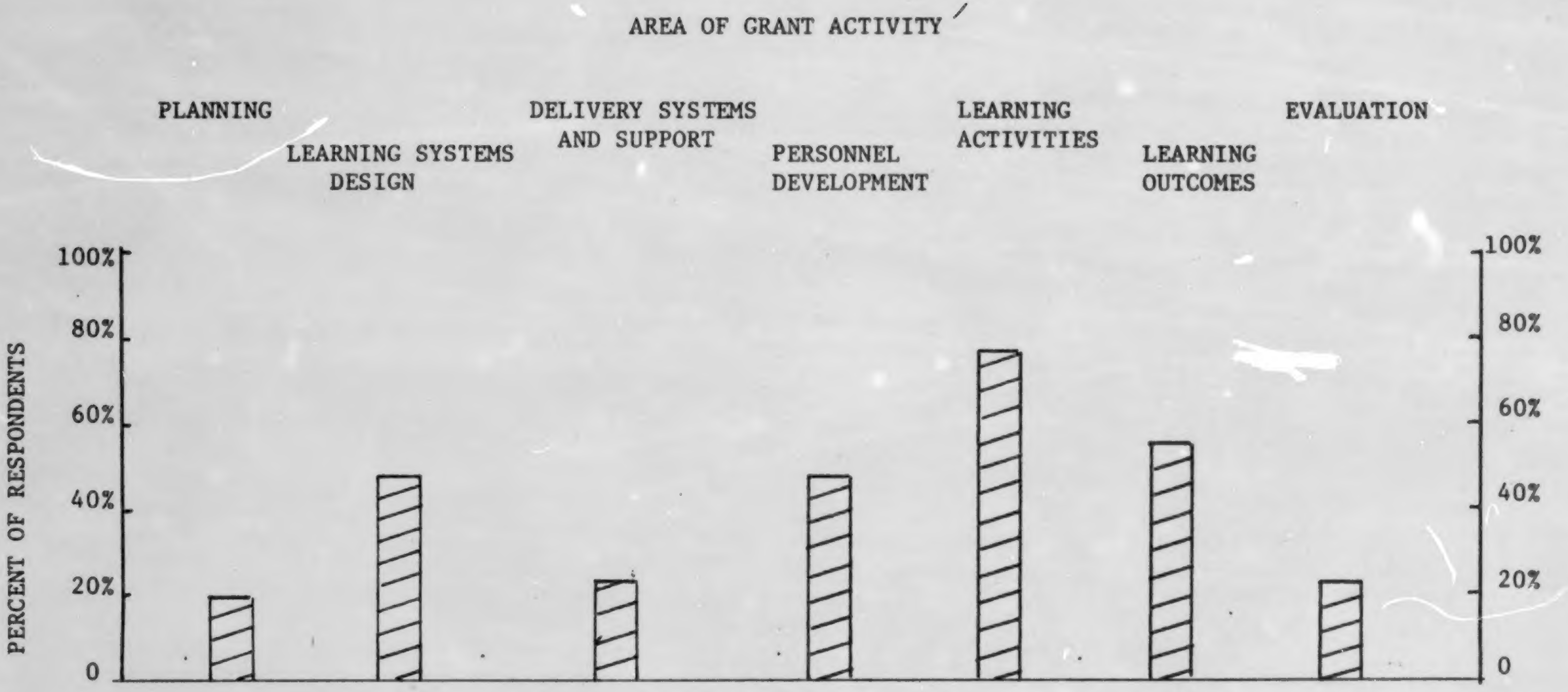


Figure 4. Percent of Respondents Reporting that their Grant Falls Within the Areas Noted

that appear as part of a grant activity, plus the number of elements from the normative map that a grant is perceived to support, plus the number of elements from the normative map that are perceived to be potentially supportive of a grant activity.

The average variety of a grant activity, computed from the responses, is 22.

If the grantees on OEE projects were spread thin, we would expect to see grants with dispersion greater than 1 and with variety exceeding (say) 5. This is precisely what we see, on average, and it indicates that the grantees are trying hard to cover a fairly wide range of activities.

Validation of Major Categories: Grantees were invited to identify major categories other than the seven appearing on the normative model, if needed to describe their activity. Only one grantee made any comment indicating that there was any problem with the categories, and this grantee said he was involved in all seven and also in "none of them." The other respondents appeared to find that they could describe their grant activity adequately with the seven major categories. It is believed that this adds validity to the superstructure of the normative model.

Summary: In summary, the data gathered appear to indicate that the major categories of the normative model are satisfactory; that the average grantee's work is quite varied and dispersed, so that the grantee is spread thin; that emphasis in grants is on learning activities; and that the relatively underemphasized areas are planning, delivery systems and support, and evaluation. (OEE contract work is involved in these areas.)

Comparison Based on Report on Learner Readiness

As a final mode of comparing EE with the normative model, a comparison will be based on a report on learner readiness for EE prepared specifically for this project [9]. It was requested that this report summarize research on what people are able to do in learning, and how learning materials and processes should be organized for compatibility. This would provide ways to assess the readiness of learners, as well as the readiness of the learning materials and processes.

This report appears to hold major implications for holistic environmental education, and for a grant program aimed at developing holistic environmental education. It also has similar implications for process-and-issue-based environmental education. The implications are so similar that no real distinction needs to be made in what is said hereafter.

The report is quite long, and only a summary of the most significant results (for our purposes) will be given here. The principal conclusions are:

1) Curriculum designers for holistic EE should focus upon children of age 12 or higher, and should emphasize the development of linkages, using peer interaction as a major process ingredient.

2) Learning materials development for holistic EE should achieve a hierarchy of knowledge and a parallel and hierarchical process for learning that knowledge.

3) No significant distinction needs to be made between children of age 12 or higher and adults, insofar as the process of holistic learning is concerned, but the entry point in the knowledge hierarchies will be dependent upon prior knowledge of the learner.

It is in the application of these three conclusions that much of what goes on in EE is defective. The various activities going on in EE tend to skirt these points.

We believe that the reason for this is that much of what goes on in EE is dispersed and varied, mainly because of the absence of capability, resources, and time, to apply these three conclusions to the conduct of environmental education: and the consequent necessity for environmental educators to try to work around these defects.

A brief elaboration on some of the foregoing is presented in Appendices C and D, but for a full discussion, the reader is referred to [9].

THE NEED FOR STRATEGIES FOR CHANGE

To be useful in the current educational environment, and in the context of OEE, strategies for change need to be focused. It is felt that the strategies for change can be limited to those that serve OEE in terms of the goals of continuous self-renewal of the Program, and in applying selectivity to the Program activities, and to those that address the implementation of environmental education nationally, especially Type 1 (holistic) environmental education.

These three points of emphasis represent the primary areas of need for strategies for change.

The OEE itself needs continuous self-renewal because of the pace of change of environmental education under the impetus of the EE Act of 1970 and various changes taking place at State levels. The Program is still young, the Law imposed much more responsibility than the OEE could possibly do justice to with its limited size, and thus left a big area for priority setting by the Commissioner, within the framework of the OEE Program. As new perceptions accrue, as past successes and failures come better into focus, as EE becomes better defined, it becomes progressively more important to be selective about what is done with the Program, to try to achieve the maximum gains for the expenditures. It is important to perceive what is most needed.

It is natural to seek to correlate Program efforts with what is perceived to be needed nationally in EE. Thus one of the aims of a descriptive analysis is to establish those needs, in order that subsequent analysis can be prescriptive.

* * * * * * * *

"...So long as a primitive group can operate in terms of the enthusiasm of its particular adherents at a given time and drop to another level of activity with less motivated followers at another time, it requires only task direction which can be generated within the group itself. But when it moves over to the utilization of information about maintaining some effective ratio of energy input to energy output and some stability in the level of its operations, it needs a more permanent and definitive form of decision making. Thus the authority structure grows in response to the development of a regulatory maintenance mechanism."

-- Daniel Katz and Robert Kahn, The Social Psychology of Organizations, John Wiley and Sons, New York, 1966.

* * * * * * * *

SOME POTENTIAL CHANGE STRATEGIES

In addressing potential strategies for change in EE nationally, it seems advisable in the light of our earlier discussions, to deal with this subject in several parts: strategies for change in implementing EE

- in formal education
- in community education
- in the interaction between the two
- in broader interactions of educational activities with the society at large

When such a discussion has been developed, it is then appropriate to turn to OEE itself, and to discuss strategies for change within OEE that would simultaneously provide for self-renewal of the OEE staff and for selectivity in the program operations.

The strategies for change in implementing EE will not be strictly separated out as outlined above, because this tends to obscure the interactions, but the reader should be prepared to notice that some of the strategies apply only to parts of EE, and not to all of EE.

Potential Process Implementation Strategies

It is intended here only to discuss major or global strategies for implementation of EE without going into details. Such details are best left for later reporting, where a prescriptive analysis is to be given in considerable detail.

The first major strategy that is needed for EE is a strategy for identifying, articulating, testing and infusing a suitable process for holistic environmental education.

We have pointed out elsewhere in this report, the choice of the term "process" in the Congressional definition as a key choice. More than any other single factor, it is the *failure* to date to identify, articulate, test and infuse a process for achieving holistic EE that *stands out in contrast to the* various *successes* that have been achieved in environmental education.

We have also indicated that the term "process" can be given multiple interpretations, and we now emphasize that it *must be* given multiple interpretations, for the simple reason that EE consists of processes within processes, and it is not sufficient to articulate only the small sub processes or only the overall frameworks of process. They must be mutually and consistently articulated before EE is satisfactorily established as an invaluable asset in our educational system.

A first step has been taken with the articulation of the programmatic process of EE mentioned earlier in this report. With respect to the subprocesses, our posture is as follows. Either the subprocesses to be developed will be mentioned in the Normative Model, or else that model itself should be modified to accommodate to any new subprocesses that may be found to be needed.

For the present, our posture is that the additional subprocess requirements are to be uncovered within the Normative Model. It will be recalled that there are seven ministructures that comprise the superstructure of that model. However one of these, "Learning Outcomes," is not a process but rather represents the desired consequences from the overall programmatic process. Hence the remaining six categories represent the origins for additional process elucidation. For review, these categories are:

Learning Activities

Personnel Development

Learning Systems Design

Planning

Evaluation

Delivery Systems and Support

Now we must look to these ministructures to identify additional critical process requirements.

Evaluation. Figure 5 shows the ministructure of the Evaluation category. It appears to us that there is an adequate tradition of evaluation in education, though there are varied styles and philosophies. Thus the need here is not to conceptualize how to do something, but merely to manage evaluation in the institutional framework of EE, and to help train project leaders in evaluation methods, so that they can either arrange for evaluation, or in low-budget projects to carry out their own instead of having none at all.

To say this another way, with a different emphasis, there has not been enough evaluation done in EE, but this is not for want of a process of doing it; rather it is for want of utilization of known processes.

Delivery Systems and Support. Figure 6 shows the ministructure of the Delivery Systems and Support category. In this area, as in evaluation, while there are things to be done, the impetus to do these things needs to come from more fundamental concerns. For example, one cannot and should not institutionalize a curriculum until there is a curriculum to institutionalize. The development of a delivery system should not be seriously considered from a process point of view without a clear view in mind of what is to be delivered and how it is to be delivered. Until some insights are available there is no reason to depart from the existing delivery system. Thus, while there are important activities to be carried out under this category, we see no major system process issues requiring invention. We simply need "to farm as well as we know how," and such changes as are needed call for adaptation of known methods rather than for major new process inventions.

Of course in the longer run, the Open University concept mentioned earlier could receive consideration as a prime innovation. But we are speaking of contemporary change. Our view is that there are higher priority immediate process requirements, as will be seen.

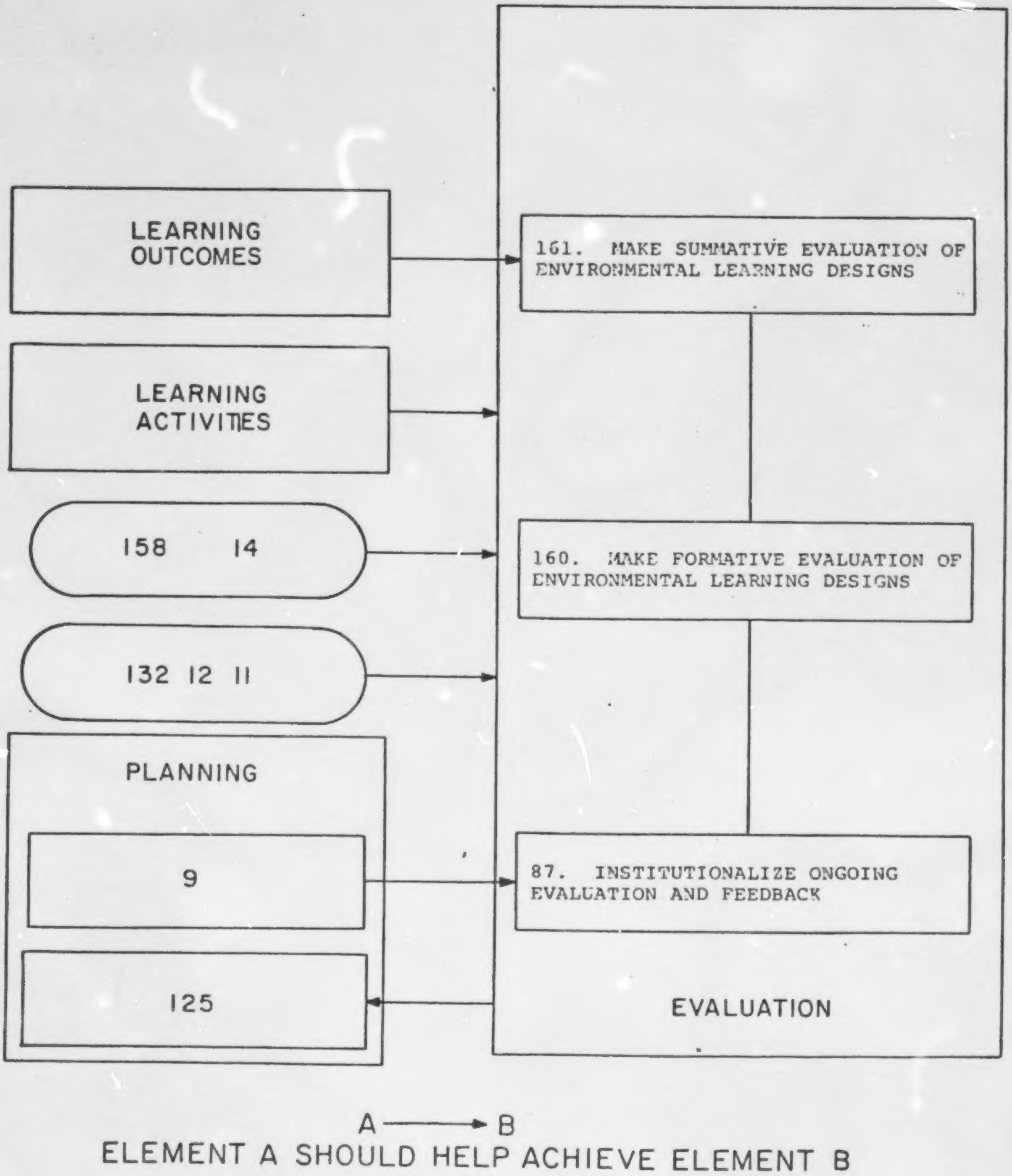

LEARNING OUTCOMES
LEARNING ACTIVITIES
158 14
132 12 11
PLANNING
9
125
161. MAKE SUMMATIVE EVALUATION OF ENVIRONMENTAL LEARNING DESIGNS
160. MAKE FORMATIVE EVALUATION OF ENVIRONMENTAL LEARNING DESIGNS
87. INSTITUTIONALIZE ONGOING EVALUATION AND FEEDBACK
EVALUATION
A → B
ELEMENT A SHOULD HELP ACHIEVE ELEMENT B

Figure 5. Structure of Evaluation Activities

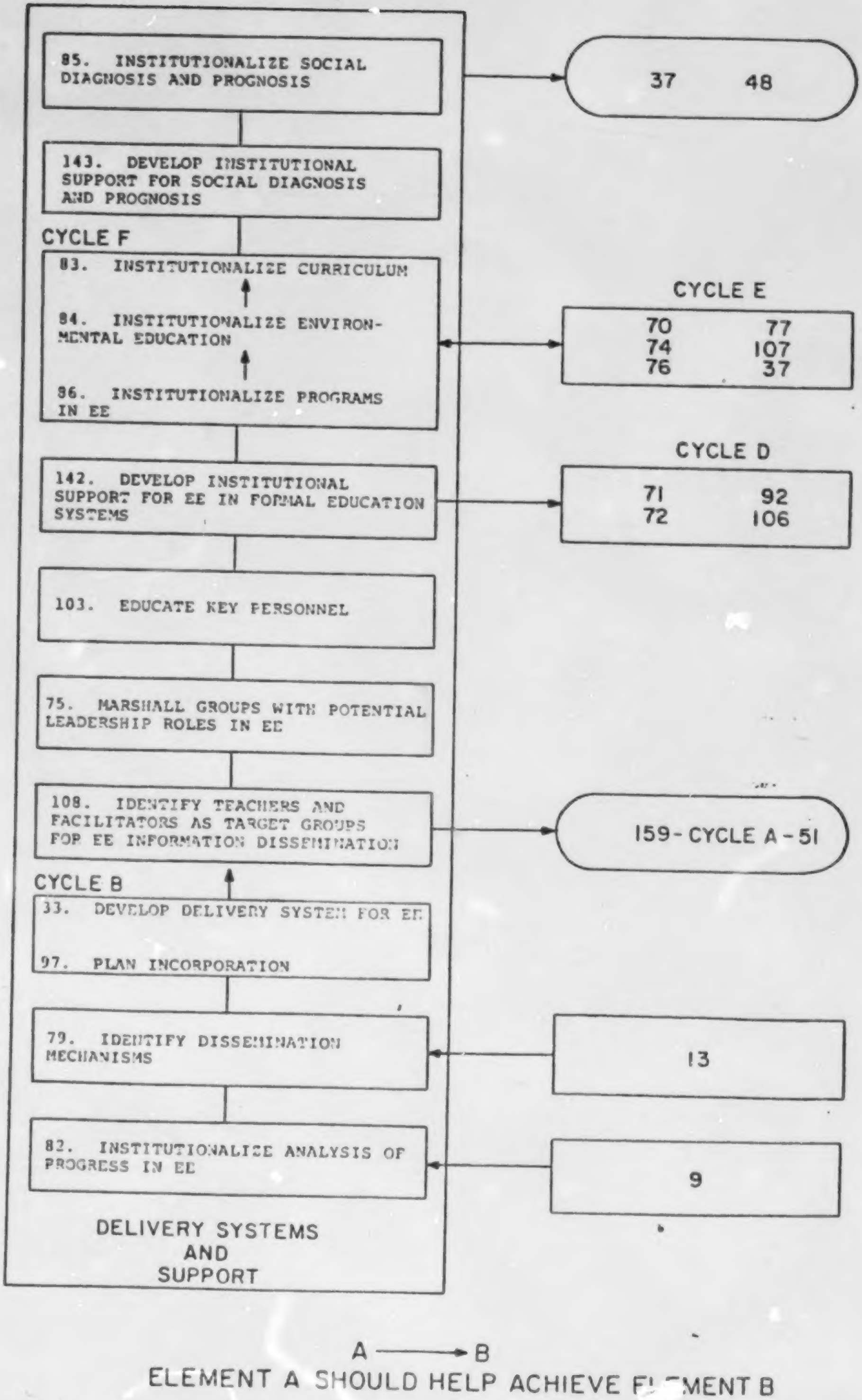

85. INSTITUTIONALIZE SOCIAL DIAGNOSIS AND PROGNOSIS
37 48
143. DEVELOP INSTITUTIONAL SUPPORT FOR SOCIAL DIAGNOSIS AND PROGNOSIS
CYCLE F
83. INSTITUTIONALIZE CURRICULUM
84. INSTITUTIONALIZE ENVIRONMENTAL EDUCATION
86. INSTITUTIONALIZE PROGRAMS IN EE
CYCLE E
70 77
74 107
76 37
142. DEVELOP INSTITUTIONAL SUPPORT FOR EE IN FORMAL EDUCATION SYSTEMS
CYCLE D
71 92
72 106
103. EDUCATE KEY PERSONNEL
75. MARSHALL GROUPS WITH POTENTIAL LEADERSHIP ROLES IN EE
108. IDENTIFY TEACHERS AND FACILITATORS AS TARGET GROUPS FOR EE INFORMATION DISSEMINATION
159-CYCLE A-51
CYCLE B
33. DEVELOP DELIVERY SYSTEM FOR EE
97. PLAN INCORPORATION
79. IDENTIFY DISSEMINATION MECHANISMS
13
82. INSTITUTIONALIZE ANALYSIS OF PROGRESS IN EE
9
DELIVERY SYSTEMS AND SUPPORT
A → B
ELEMENT A SHOULD HELP ACHIEVE ELEMENT B

Figure 6. Structure of Delivery System and Support Activities

Planning. The planning ministructure is shown in Figure 7. Here we identify, by the heavy shaded lines, two major activities that need to be pursued to develop a process:

153. Synthesize educational research on methods and tools appropriate to EE
31. Develop core themes for EE

The pursuit of these two activities in parallel would help close a major process gap, primarily (in the short run) for purposes of formal education. In the longer run, this would be highly beneficial to community education as well.

Learning Systems Design. The Learning Systems Design ministructure is shown in Figure 8. The primary process requirement involves:

133. Prepare guides for developing community EE

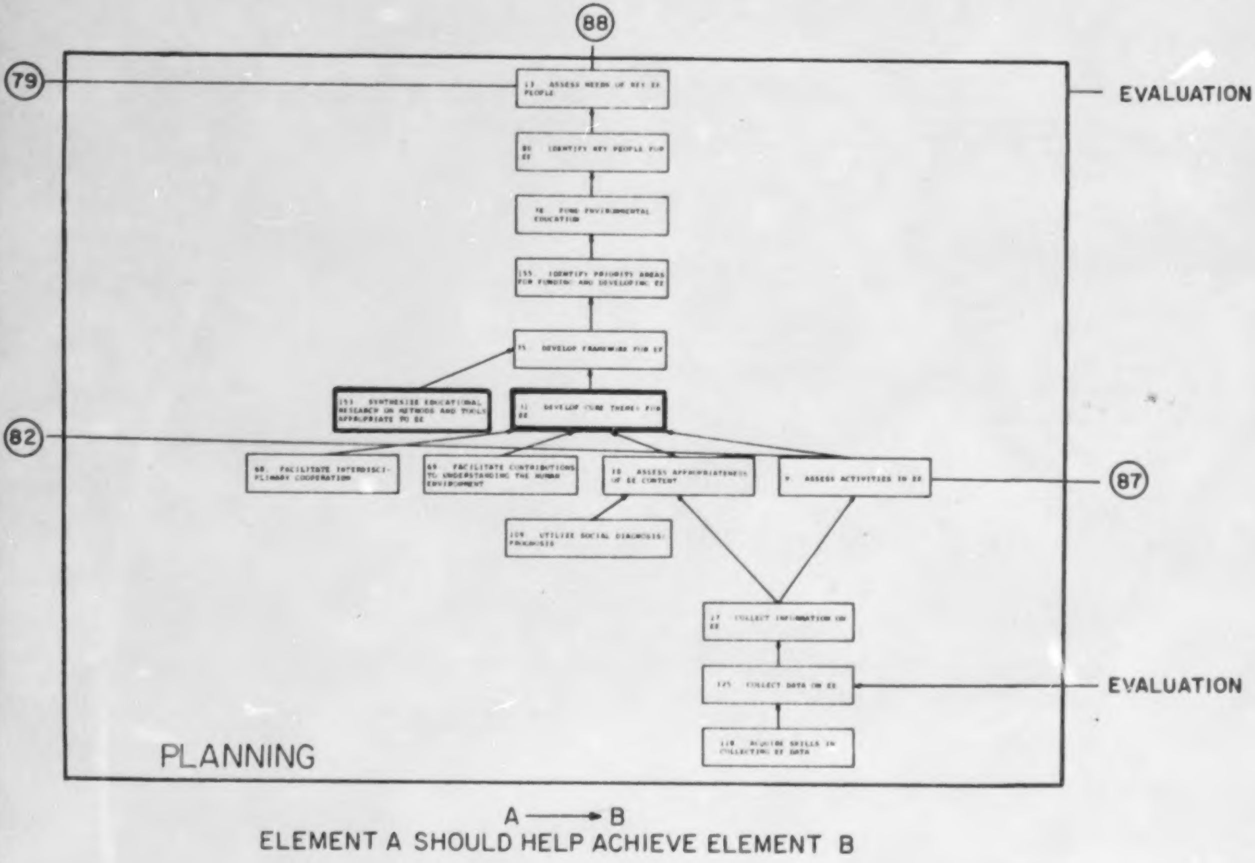
and the thrust here should be upon effective learning, given the constraints of timeliness and issue-orientation.

Further emphasis has been given to dissemination, but this requires simply that known dissemination techniques be assessed and that existing knowledge in this area be brought to bear more effectively in EE. This recognizes the availability of materials that have not yet been disseminated. In some instances, this will require that the materials be evaluated, but community education is not so involved with design as formal education.

Personnel Development. Figure 9 shows the Personnel Development ministructure. Here the major process development, we believe, needs to be done in the activity:

146. Develop objectives for community EE facilitator training.

Again, while all the activities shown in this ministructure are important and should continue to go on, the emphasis should be placed on 146. The reason will, it is believed, be clear when this section is summarized.



88
79
EVALUATION
13 ASSESS NEEDS OF KEY EE PEOPLE
80 IDENTIFY KEY PEOPLE FOR EE
78 FUND ENVIRONMENTAL EDUCATION
155 IDENTIFY PRIORITY AREAS FOR FUNDING AND DEVELOPING EE
35 DEVELOP FRAMEWORK FOR EE
153 SYNTHESIZE EDUCATIONAL RESEARCH ON METHODS AND TOOLS APPROPRIATE TO EE
31 DEVELOP CORE THEMES FOR EE
82
68. FACILITATE INTERDISCIPLINARY COOPERATION
69 FACILITATE CONTRIBUTIONS TO UNDERSTANDING THE HUMAN ENVIRONMENT
10 ASSESS APPROPRIATENESS OF EE CONTENT
9. ASSESS ACTIVITIES IN EE
87
109 UTILIZE SOCIAL DIAGNOSIS/PROGNOSIS
27 COLLECT INFORMATION ON EE
125 COLLECT DATA ON EE
EVALUATION
118 ACQUIRE SKILLS IN COLLECTING EE DATA
PLANNING
A → B
ELEMENT A SHOULD HELP ACHIEVE ELEMENT B

Figure 7. Structure of Planning Activities

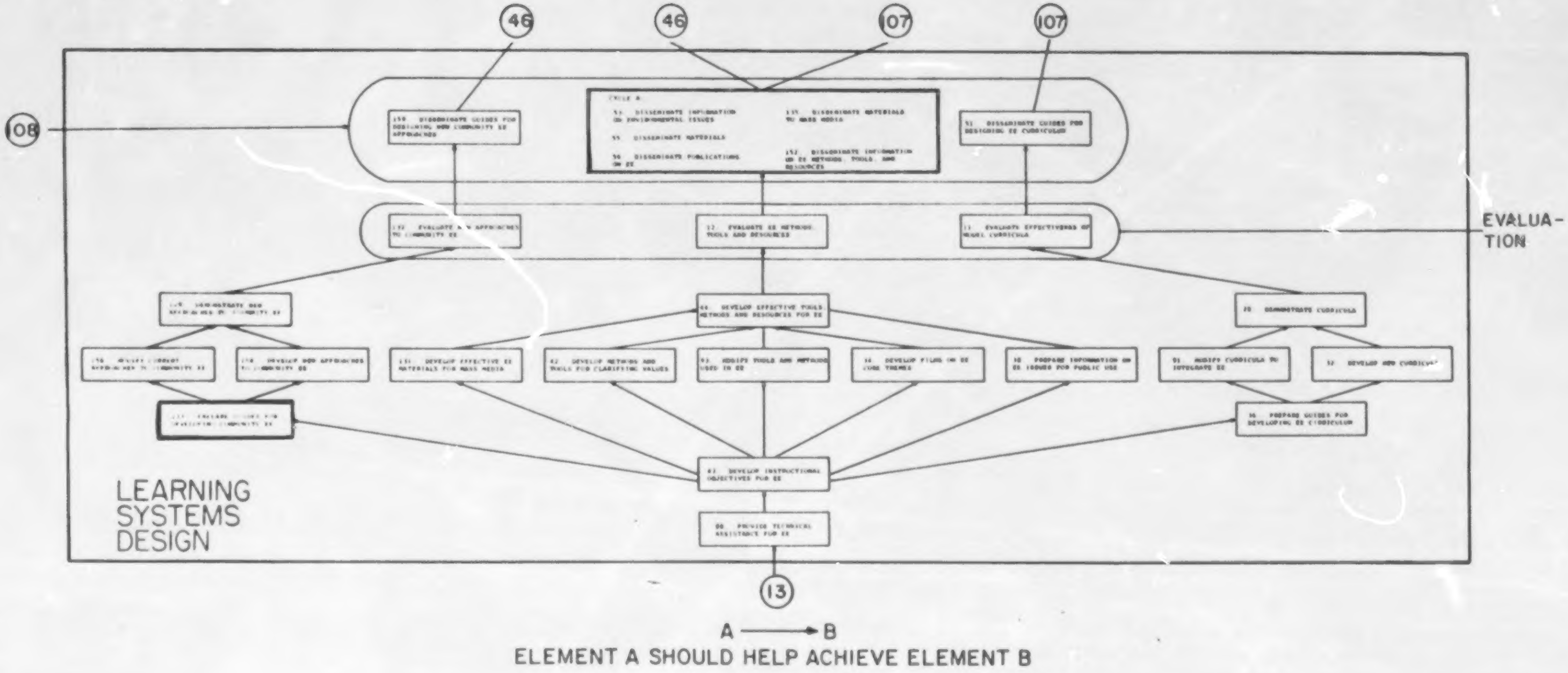

46
46
107
107
108
CYCLE A
53 DISSEMINATE INFORMATION ON ENVIRONMENTAL ISSUES
135 DISSEMINATE MATERIALS TO MASS MEDIA
55 DISSEMINATE MATERIALS
56 DISSEMINATE PUBLICATIONS ON EE
152 DISSEMINATE INFORMATION ON EE METHODS, TOOLS, AND RESOURCES
159 DISSEMINATE GUIDES FOR DESIGNING NEW COMMUNITY EE APPROACHES
51 DISSEMINATE GUIDES FOR DESIGNING EE CURRICULUM
132 EVALUATE NEW APPROACHES TO COMMUNITY EE
12 EVALUATE EE METHODS TOOLS AND RESOURCES
11 EVALUATE EFFECTIVENESS OF MODEL CURRICULA
EVALUATION
DEMONSTRATE NEW APPROACHES TO COMMUNITY EE
44 DEVELOP EFFECTIVE TOOLS, METHODS AND RESOURCES FOR EE
20 DEMONSTRATE CURRICULA
MODIFY CURRENT APPROACHES TO COMMUNITY EE
DEVELOP NEW APPROACHES TO COMMUNITY EE
131 DEVELOP EFFECTIVE EE MATERIALS FOR MASS MEDIA
42 DEVELOP METHODS AND TOOLS FOR CLARIFYING VALUES
93 MODIFY TOOLS AND METHODS USED IN EE
DEVELOP FILMS ON EE CORE THEMES
PREPARE INFORMATION ON EE ISSUES FOR PUBLIC USE
MODIFY CURRICULA TO INTEGRATE EE
DEVELOP NEW CURRICULA
PREPARE GUIDES FOR DEVELOPING COMMUNITY EE
PREPARE GUIDES FOR DEVELOPING EE CURRICULUM
DEVELOP INSTRUCTIONAL OBJECTIVES FOR EE
PROVIDE TECHNICAL ASSISTANCE FOR EE
LEARNING SYSTEMS DESIGN
13
A → B
ELEMENT A SHOULD HELP ACHIEVE ELEMENT B

Figure 8. Structure of Learning Systems Design

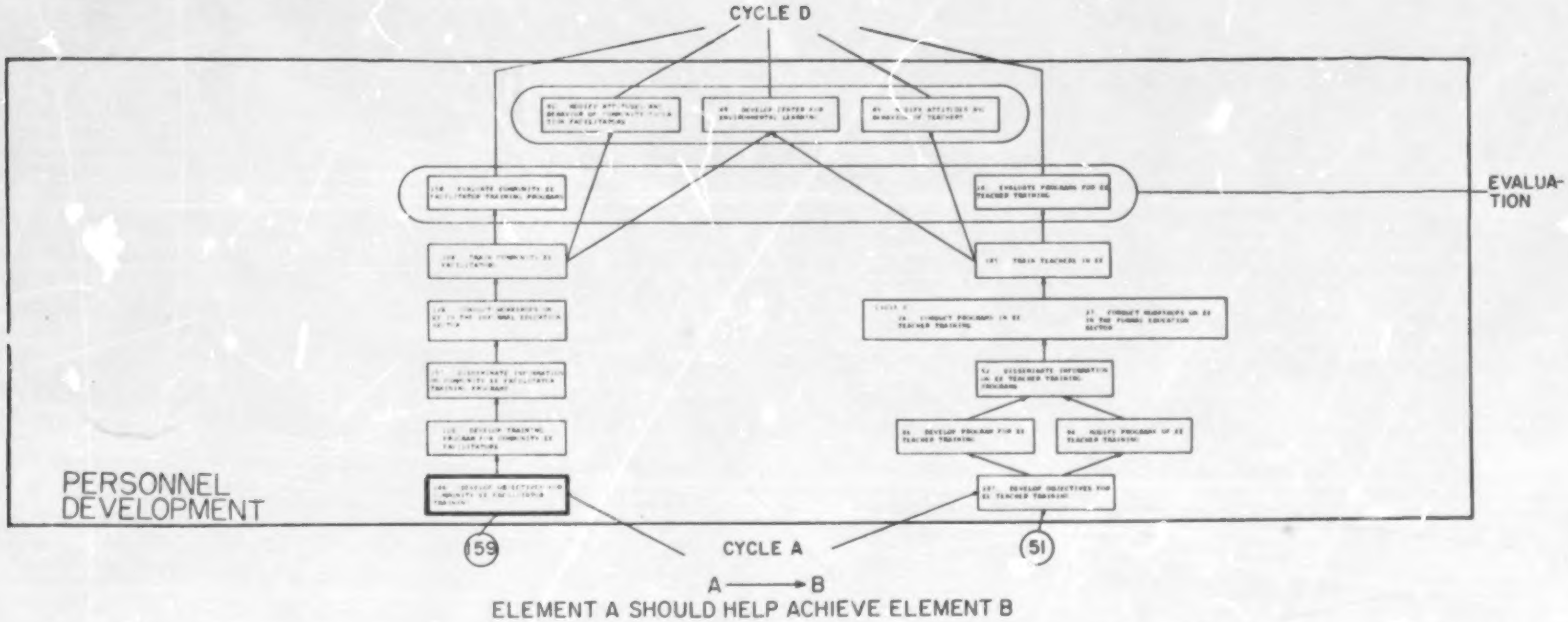

CYCLE D
MODIFY ATTITUDES AND BEHAVIOR OF COMMUNITY EE FACILITATORS
DEVELOP CENTER FOR ENVIRONMENTAL LEARNING
MODIFY ATTITUDES AND BEHAVIOR OF TEACHERS
EVALUATE COMMUNITY EE FACILITATOR TRAINING PROGRAMS
EVALUATE PROGRAMS FOR EE TEACHER TRAINING
EVALUATION
TRAIN COMMUNITY EE FACILITATORS
TRAIN TEACHERS IN EE
CONDUCT WORKSHOPS ON EE IN THE INFORMAL EDUCATION SECTOR
CONDUCT PROGRAMS IN EE TEACHER TRAINING
CONDUCT WORKSHOPS ON EE IN THE FORMAL EDUCATION SECTOR
DISSEMINATE INFORMATION ON COMMUNITY EE FACILITATOR TRAINING PROGRAMS
DISSEMINATE INFORMATION ON EE TEACHER TRAINING PROGRAMS
DEVELOP TRAINING PROGRAM FOR COMMUNITY EE FACILITATORS
DEVELOP PROGRAM FOR EE TEACHER TRAINING
MODIFY PROGRAMS OF EE TEACHER TRAINING
DEVELOP OBJECTIVES FOR COMMUNITY EE FACILITATOR TRAINING
DEVELOP OBJECTIVES FOR EE TEACHER TRAINING
PERSONNEL DEVELOPMENT
159
CYCLE A
51
A → B
ELEMENT A SHOULD HELP ACHIEVE ELEMENT B

Figure 9. Structure of Personnel Development

Learning Activities. Figure 10 shows the Learning Activities ministructure. Here is the core of education, and this section has been saved for the last because it is the core. In examining this section, the rationale for activities in the other sections of the Normative Model should be uncovered.

In this area, we choose to focus upon three activities which appear to have major process requirements. These are:

20. Conduct issue-oriented efforts regarding human settlements
71. Facilitate use of EE materials and practices
73. Integrate outdoor education with social and behavioral principles

There is good literature and background for carrying out many of the other activities shown here, but these three represent a focus on process that requires development, elaboration, test, and evaluation.

There was a temptation to focus on Cycle E, but we refrained from doing so, because the three lower level elements that are identified here as major concerns represent the major substantive requirements in order to make possible doing the things called for in Cycle E.

Summary of Process Needs. In summary, we have reviewed the Normative Model for purposes of identifying key process needs. So far we have uncovered several within the ministructures of the Normative Model. These need not be repeated here. However we must add additional remarks. These process needs are highly interrelated with the overall conduct of environmental education, and they should not be addressed as independent items, but rather as highly dependent items. For example, the development of objectives for community EE facilitator training has to be done with a correlation to the preparation of guides for developing community EE. And the integration of outdoor education with social and behavioral principles surely needs to correlate with the development of core themes for EE. Thus another aspect of the process needs is that all of these key needs should, themselves, be conceptualized within the framework of a learning system design.

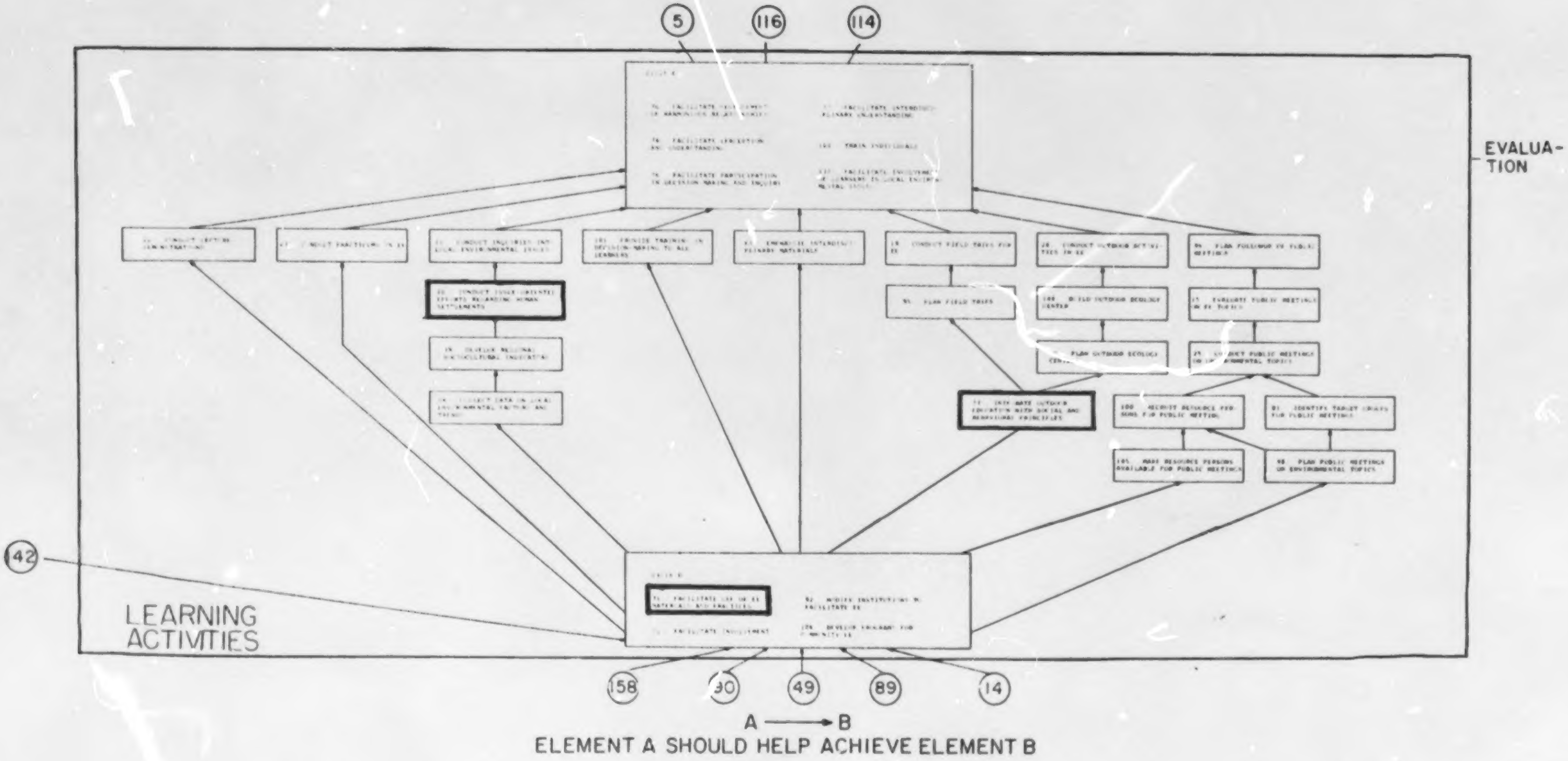

5
116
114
EVALUA-
TION
142
LEARNING
ACTIVITIES
158
90
49
89
14
A → B
ELEMENT A SHOULD HELP ACHIEVE ELEMENT B

Figure 10. Structure of Learning Activities

Thus, to summarize the process needs, it is our opinion that the primary process need is to design learning systems for EE that emphasize new results concerning the particular process ingredients mentioned in this section (though not to the exclusion of the other activities shown in the Normative Model.)

In closing, one remark can be made about the development of core themes for EE. A reasonable question would be to ask why this activity has been set forth as a process requirement. This question will be dealt with in the next section.

Strategies Related to Content

The content of environmental education, that is what is supposed to be learned that is relevant to the environment, appears in the Normative Model in an action sense. The Model itself is a process model. Thus one looks at the Model and asks "how does the content enter in?"

Inspection of the various ministructures will show that content does or does not enter these ministructures specifically as follows:

In the Learning Activities, through elements 18, 39, 20, 21
In Personnel Development, there is no explicit mention of content
In Learning System Design, there is no explicit mention of content
In Planning, through elements 109, 10, 31
In Delivery Systems and Support, there is no explicit mention of content
In Evaluation, there is no explicit mention of content
In Learning Outcomes, through elements 114, 148, 123, 149, 150, 3, 8, 117, 115, 124, 113, 121, 16, 6, 120, 29, 136, 112, 134, 7, 138, and 139

One can infer some very significant conclusions from this analysis related to content. Let us reflect upon some of these.

POINT 1. The fact that the vast majority of the activities do not specifically point to environmental content shows us that there is a major process problem in delivering environmental education.

POINT 2. The relative paucity of specific activities related to content suggests that content may get overlooked. There are so many other things to fund to make the system operational, it is not totally inconceivable that the environment would get lost somehow in the struggle to develop a system of environmental education.

POINT 3. It seems reasonable that if content were dealt with adequately, this would help facilitate doing all the other things shown in the Normative Model. And certainly the frequent reference to the environment in the Learning Outcomes portion of the Normative Model reminds us that evaluation is not going to be much concerned about all the other activities, unless they in some way produce the results sought.

POINT 4. The fact that relatively few activities deal with content suggests that it ought to be reasonably easy to focus energies upon those relatively few activities, and to make some progress in these areas. Instead of being overwhelmed by the complexity of the overall process, let us make some advances with content.

POINT 5. Some of the process questions themselves refer specifically to how environmental content can be learned. These are the process questions that require the most attention. And it is these that we have elected to emphasize by heavy shading in the ministructures. By following these, we are getting at process and content simultaneously.

POINT 6. Because of the complexity of environmental content itself, is is not, repeat not, adequate to develop content without simultaneously developing the learning process that goes along with it. This is completely consistent with Gagne's curriculum development theory, and also passes the test of "common sense."

What can be said to summarize the concern with content of EE in the context of strategy?

- Content and process need to be developed concurrently, and with distinction between formal and community education
- For formal education, core themes need to be developed concurrently with a process that can be demonstrated to be effective in learning with the linkage model
- For community education, an environmental learning system perspective is needed that will help assure efficient use of available content material, including its gathering, organization, discussion, presentation, and use in decision making. Over a period of years, this will be helped by improvements in formal education. In the interim, attention must be given to this in community education settings, with demonstrations as part of OEE technical assistance activities. This will require considerable advance development and preparation.
- While in-service training is very important, it can't be done well until the combined content/process materials are reasonably well-developed.

Finally, it is expected that some progress in these areas will be made on the UVA contract with OEE during 1979.

* * * * * * * *

"All organizations are composed of parts organically related to one another in order to accomplish three core activities. They are to (1) achieve the organizations' goals (i.e., the consequences for which they were intended), (2) maintain their internal system, and (3) integrate themselves with their environment.

"All organizations begin with a formal structure designed to achieve their core activities. To date, all the structures designed have been inadequate in their inability to capitalize on human potentialities. Participants, therefore, out of a sense of constructive intent, modify the formal designs by creating new and informal parts which they make organic to the system. The system, composed of informal and formal parts integrated into an organic whole, may be called the living system."

-- Chris Argyris, "On the Effectiveness of
Research and Development Organizations",
American Scientist, 56, 4, 344-355, 1968
(69th Annual Convention Lecture)

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Potential Strategies for OEE

In striving to move forward with strategies for implementation of EE, the Office of Environmental Education requires strategies for its own continuing program evolution. Modern management theory recognizes that organizational strategies cannot sensibly be formulated without taking into account the constraints, resources, and schedules of the organization itself. Thus while it is possible to discuss broad strategies for OEE to use in developing its program without bringing in a time scale, or a work schedule, such a discussion will be much more valuable if it can be placed in a realistic time perspective in terms of the capabilities of OEE. It is always possible to imagine that the OEE may change in size to accommodate to various strategies, but even if some of the assumed constraints are taken off, it is still helpful to be able to modify a set of recommendations from a given base of assumptions. Therefore the potential strategies for OEE are suggested in the light of the assumption that the size and budget of OEE will not change substantially.

This assumption does not affect the strategies in terms of substance, only in terms of schedule.

Furthermore, it is necessary in devising and presenting strategies to have a characterization of OEE that represents the various kinds of activities which the OEE has and is engaged in pursuing.

For this purpose, OEE is assumed to be engaged in carrying out the following major activities:

A. A grant awards activity.

B. A grants monitoring and assessment activity.

C. A grantee technical assistance activity.

D. A contract definition and procurement activity.

E. A contract monitoring and assessment activity.

F. An expanding dissemination activity

G. Agency activities allied with the continuing planning and budgeting, and interaction with the other involved federal agencies such as GSA and OMB.

H. Coordination with other federal activities in environmental education.

(These eight activities have, in the past, more than taken up the full resources of OEE. Activity H, though requested in the EE Act of 1970, is an example of an activity that could in itself take all of the time of OEE if it interpreted EE to mean "background EE" or "experiential EE," and it is only by virtue of having interpreted EE as "holistic" or "issue-based" that the OEE has been able to satisfy item H, since there has been so little of such environmental education to coordinate with outside of the OEE'S own program.

Evidently one could discuss strategies for each of these eight major activity areas, and that is intended to be done next.

Grants Award Activity. In the past, OEE has awarded more grants than it could reasonably be expected to monitor, and for which it could reasonably be expected to provide technical assistance. Also the grants have been awarded typically for one year. This is very inefficient, since the grantees often require several months just to find out how to operate, and the OEE staff is overburdened by such grantee turnover. Continuation of this practice by the OEE would not leave it adequate time and effort to spend on the other seven kinds of activity. This has been noticed by Congress, especially in OEE's slighting of activities of type C and F. OEE has already moved in a very satisfactory way to increase its type C activity, and is working to expand its type F activity. However it has not been able to do enough in several other types. The obvious potential strategy for the Grants Award Activity is:

a) Decrease the number of grants awarded

b) Increase the duration of the grants awarded

Grants Monitoring and Assessment Activity. The monitoring of grants has been only fairly satisfactory in the past, because of OEE work overload. This can be readily demonstrated by simple calculations of workload, and by noting that a moderate and significant percentage of grantees have not filed final reports in the past. Given the recently expanded and quite successful technical assistance effort (The Leesburg Institute '78), and anticipating that the number of grants awarded would be decreased while the duration would be increased, it can be expected that the OEE can make a very marked improvement in the grants monitoring activity.

The strategy involved here is to estimate, based on experience, how much OEE staff time should be involved in this (and in other) activity, and to use such estimates as partial basis for determining how many grants to award. Another component of the strategy is to establish a standardized grant monitoring procedure, which would facilitate workload estimation.

Grantee Technical Assistance Activity. There is no doubt that the technical assistance activity initiated in Boulder, and greatly improved in Leesburg, has been very well received by the OEE grantee community. The kind of knowledge shared in Institute-'78 will surely make a significant improvement in the grantee activities, helping to assure that grant objectives are achieved, and that more timely and more useful reporting will occur. This activity definitely should be continued, and the estimated workload in carrying out this kind of assistance should be budgeted in determining the overall distribution of OEE staff work among the eight activity areas.

Contract Definition and Procurement. The OEE has had a strategy for this in the past, which consists of attempting to procure through contract those program ingredients that cannot be achieved through grants. This is an appropriate strategy, and it need not be changed. While the OEE could become considerably more efficient if some of the federal procurement regulations were amended, so that intellectual products could be purchased in a manner somewhat different from office furniture, this is beyond the control of OEE, and thus beyond the scope of this discussion.

However, the OEE should estimate the staff time needed for this activity, and should not seek to procure more than it has time to monitor thoroughly.

Contract Monitoring and Assessment Activity. In the past OEE has underestimated the need for contract monitoring. While contracts can be viewed as ways to purchase products that OEE cannot produce with staff resources, they cannot be viewed as ways whereby the staff can be freed in time. Instead, time must be allocated for monitoring contracts, and OEE needs to devise a formula for estimating this time and factoring it into their overall annual plan.

Progress reviews should become more frequent, and should be scheduled regularly for all contracts. Outside experts should often be used to assist the OEE in clarifying progress. Such experts should be briefed thoroughly on OEE's program before receiving such assignments. The complexity of EE poses unusual and challenging problems of communication. OEE should budget more internal staff time to deal with this reality in monitoring and assessing contracts and grants.

An Expanding Dissemination Activity. Every indication is to the effect that OEE will have to budget an increasing amount of staff time for activities related to dissemination. This is important in part because it is an area that approaches the "bottom-line" insofar as the use of materials developed in OEE grant and contract effort is concerned. Also, it is a very difficult and tangled area to work with, and will require strenuous efforts to make significant achievements. The time budgeted for this activity will have to be drawn away from time previously used in other activities.

Agency Activities. It is inappropriate in this report to advise OEE on strategies associated with the allocation of time to requirements of its own agency, or of other related agencies. However, OEE should realistically assess the amount of its key staff time that must be allocated to such activities, and allow for this in spreading its time into the other seven areas.

Coordination with Other Federal EE Activities. This activity area has not been a major activity in the past, but it is consistent with the EE Act, and it is reasonable to assume that it will occupy more attention as time goes on. A planned time budget in this area should be factored in, in planning for the other activity areas.

Now that the eight original activity areas have been discussed, it can be seen that for completeness a ninth should be added to the list, which is:

> I. OEE internal time-budgeting activity, aimed at allocating time across the other eight activities as a basis for estimating the amount of effort that will go into each, thereby helping to schedule the planned program effort for the current and future years.

The foregoing all pertain to self-renewal of OEE itself, and its consequent program effectiveness. There remains the issue of strategies for selectivity in the program. This issue focuses upon what technical areas should be encouraged in grants and contracts awards, or in a word upon priorities.

Priorities clearly should be related to the process and content strategies for EE, but should strike a continuing balance (as in the past) between formal and community education.

Priority Development

In considering strategies for implementing process and for developing content, we have not yet correlated the strategies with the mode of operation of OEE. Now it is time to do that.

The first thing that should be recognized is that it is almost never possible to create a discontinuity in a program by shifting abruptly to a new set of priorities. Moreover, the bulk of OEE's funds go to grant activities, and this appears to be essential. The grants sustain a continually improving set of activities in EE. Thus the strategies mentioned earlier need to be tempered by this fact. Moreover, it is unrealistic to expect grantees to respond in a quality way to priorities in the short run, though proposals might be cosmetically tailored to appear to favor the priorities.

Thus the overall strategy of the OEE should be to phase in the recommeded strategies somewhat as follows:

> Taking account of the OEE's internal constraints and time allocations, only those changes should be actively promoted that satisfy the following conditions:

a) The OEE can clearly manage those changes in a current budget cycle

b) The current round of grants does not appear to address adequately the recommended changes

c) Contractors can be found who can carry forward the recommendations

d) Changes can be phased into the overall programmatic plan without dysfunctional upheavals in forward momentum and progress

While this might appear to be a conservative, undaring, urresponsive approach to program evolution (at first glance), in our opinion this approach is likely to have much more lasting value. For one thing, it allows time to evaluate each new development in the light of the overall system perspective, and to modify the latter in the light of new knowledge. For another, it affords an opportunity to cement past gains, and not to lose them in the shuffle.

Finally, and perhaps most important of all, it allows time for the necessary integration, so that what is produced is not a set of inconsistent, fragmentary processes and materials, that would then require a decade of integration, but rather it welds things together as they go, eliminating the need for a massive cleanup.

It is good management practice and good educational practice.

The four conditions should not be interpreted to say that change should be achieved only through contract efforts. On the contrary, it is believed that in the continuing evolution of EE, the grant community's own emphasis will necessarily move in the directions indicated. Thus the role of contract work should be primarily a supplement to current grant activity and a leading indicator of future grant activity.

CONCLUSIONS AND RECOMMENDATIONS

The definition of environmental education set forth by Congress went beyond what has been going on in the field. Thus it has proved difficult to talk about the subject. To ease this difficulty, five types of environmental education have been identified.

The Congressional definition represents one of the five types. It is the type that lies at the pinnacle of education, and is best thought of as a difficult challenge awaiting further response.

Environmental education is largely carried out by either a formal education process or by a community education process. Both are desirable, and the strengths of one are the weaknesses of the other. They supplement each other.

A programmatic model of environmental education helps lay out what would be needed to create an effective system of environmental education. Several kinds of analyses reveal that progress has been made toward this system in the past decade, but that considerable work remains to be done.

The OEE grant program has evolved toward what was called for in the OEE Act, as indicated by comparisons of early grant activity with more recent grant activity.

Certain specific weaknesses remain, and their correction will be a major area for continued effort. Federal effort in this area will be largely in the form of technical assistance, grant assistance, and contract assistance.

Needed improvements will have to be reflected in a more systematic approach to OEE management than has been possible in the past. Now it is possible to begin to allocate OEE staff resources across the several dimensions of its program, and to begin to use the results of past grant and contract work to provide increasingly valuable technical assistance, using methods that have recently become established: the institute format and the accompanying co-learning activities that go along with it.

Future efforts in formal education will benefit from increasing attention to the requirement for developing a satisfactory EE content and process combination.

Future efforts in community education will benefit from greater use of regional resources arrived at through more effective networking and better dissemination of issue-based materials.

Both community and formal education will benefit from a concept of a regional environmental learning system that is presently being developed.

It now becomes particularly important for the present report and those to come on this project to be assessed by the EE community, and for appropriate feedback to be developed. This will help assure that a valid and consistent conceptual base will continue to evolve for environmental education.

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APPENDIX A

OEE CONTRACTS

by

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Prepared for Presentation to the
Institute '78 on Environmental Education

Leesburg, Virginia
September 19, 1978

OEE CONTRACTS

by

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ABSTRACT

The Office of Environmental Education awards both grants and contracts. During its existence, it has awarded several hundred grants, but only a few contracts. The contracts are intended to complement the grants, primarily by carrying out activities aimed at improving the program along lines required in the Environmental Education Act and Regulations.

One completed contract and two ongoing contracts are described and related to the program of the Office.

The "Arizona Project" inventoried and analyzed existing natural environment-based educational programs and activities. Completed in 1975, it set forth a primary recommendation "to develop core themes and a conceptual structure in environmental education that synthesizes and integrates pertinent subject matter across and between a variety of traditional disciplines." Nine supporting recommendations were offered, along with a discussion of five core themes that could be used to provide focus in environmental education. The results of a national survey of environmental education provided a basis and background for the recommendations and core themes.

The "Far West Laboratory Project" has develop a set of environmental education teacher training models. Two of these models address Environmental Education with a special focus on energy; the others aim at fusion of Environmental Education (EE) with science and social studies. The two models that have special focus on energy are developed for two distinctively different target groups. The first is intended for high school teachers. The second model is aimed at community groups identified as leaders in fields of environmental concerns. The components of the models, their structure, and the approach to their design, however, are quite similar.

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The University of Virginia consortium is conducting a project that has several facets. One facet involves the analysis of all of the grant products and reports generated during the period FY-1971 through FY-1976 through Office funding. From this analysis will come materials suitable for program use in illuminating the results of the grant activity for a variety of audiences, ranging from persons in the legislative and administrative branches of government to practitioners of environmental education, who wish to benefit from previous grant activity. Another facet has to do with the development of a conceptual structure for environmental education that will allow effective communication about this field for both technical and administrative communications. A third facet involves making recommendations for the future of environmental education that will be germane to the program of the Office.

The normative map developed through the University of Virginia project is now available for inspection, and it can be examined to see what amendments are advisable. Following a period of assessment, it can be used to portray what environmental education can become in the years ahead.

OEE CONTRACTS*

by

John N. Warfield[+] and Bela Banathy[++]

The Regulations governing the Office of Environmental Education (OEE) provide for "a program of grants and contracts to support research, demonstration, and pilot projects designed to educate the public on the problems of environmental quality and ecological balance" [Ref. 1, Subpart A, Section 183.1]. At the time of writing of this article, the Office of Environmental Education had awarded grants and contracts in the ratio of approximately 100 to 1. The contract portion of the Office's activity is not as small as this ratio would indicate. It is estimated that funds have been apportioned among grants and contracts in the ratio of approximately 10 to 1, this ratio being estimated across the entire life of the Office. Dissemination of results of grants and contracts has been limited in the past, but it can be expected that in the future the dissemination of results will increase substantially.

Information on the grants portion of the program was provided in a Boulder Consultation sponsored by OEE, and reported in a Proceedings [2]. Additional information is being made available in this Institute*.

The contracts work has not been reported to any significant extent, other than through reports to OEE. It is the purpose of this paper to report to the Institute on several of the contracts sponsored by the OEE.

Many are not aware of the legal distinction between a grant and a contract, nor of the accompanying substantive distinction. A grant is awarded based upon the initiative of the proposer, who states a desire to carry out certain activities, in order to achieve self-selected purposes. The OEE, with the assistance of its field readers, examines many grant applications (probably about 10 or more for every one that receives an award), to determine, among other things, whether the grant meets the conditions under which the EE Act and Regulations make federal funding legal. For those that are judged to meet the legalities, various quality and priority judgments are made that lead, eventually, to award or non-award. Once the award is made, the grantee is under certain obligations to perform substantially as set forth in the applicant's own grant application.

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*Prepared for presentation to the Institute '78 on Environmental Education, Leesburg, Virginia, September 19, 1978

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Contracts, on the other hand, involve a significantly greater initiative by OEE itself. From its perspective on the whole program of OEE, and its knowledge of the environmental education scene from a national perspective, OEE makes certain judgments about what is required to lead to a healthy, effective, and productive program. On the basis of such judgments, OEE makes contract awards. For such awards, OEE governs what is done, at least from a broad overview, and can hold contractors to specific tasks and even negotiate changes in contracts at its own initiative in the light of changing conditions within OEE or within the program of OEE. One major aim of the OEE contracts activity is to provide significant substantive support to the continuing grants portion of the overall OEE program. In a sense, one might say that OEE's contract activity functions somewhat like a "think tank" for grantees, though on a long time horizon, and not on a day-to-day or month-to-month basis.

Another way to view the contracts portion of OEE's program is that it is intended to fill gaps that are detected between what the Law exhorts be accomplished, and what appears to be happening in the grants efforts. In order to do this well, the OEE clearly needs to maintain a good awareness of what is happening in both the grants and contracts activities.

Also, it is highly desirable that grantees become aware of what is going on in the contracts effort, as well as what is going on in the grants effort.

In this paper, three specific contract efforts will be described. Since the Government tends to use rather long titles for its contracts, we shall be arbitrary in our nomenclature. However the full titles of several of the reports we shall discuss appear in the list of References at the end of the paper.

THE "ARIZONA PROJECT"

The first contract to be discussed will be called the "Arizona Project." This project was carried out by the Center for Environmental Studies of Arizona State University in conjunction with the Association of American Geographers, and involved survey assistance from the University of Illinois.

This project inventoried and analyzed existing natural environment-based educational programs and activities in the U.S. Completed in 1975 [3], it set forth a primary recommendation

> "To develop core themes and conceptual structure in environmental education that synthesizes and integrates pertinent subject matter across and between a variety of traditional disciplines."

This recommendation reflected the belief of the investigators that environmental education would benefit from a significant amount of organizational work, both to help describe what the field is, and to describe what the field is about. The recommendation was based on the results of a national survey of environmental education. The results of the survey also led the investigators to present nine supporting recommendations. The full recommendations appear in [3] (which is available upon request from OEE). Short versions, presenting the topics of the recommendations are given in Table 1.

To elaborate upon the core themes mentioned in the primary recommendation, the Arizona project described the five core themes shown in Table 2. It was a recommendation that these five core themes, either singly or in some combination, be elaborated as core themes from which to pursue environmental education.

Subsequently, OEE awarded a contract aimed at developing teacher training models relevant to the relationship between energy and the environment. This contract placed the core theme of energy flow within the context of personnel development, the latter being one of the areas in which OEE is charged to be active in its grants and contracts program.

TABLE 1

TOPICS OF SUPPORTING RECOMMENDATIONS

1. Projects that demonstrate understanding of interrelationships of issues
2. Inclusion of values clarification
3. Awareness of career opportunities, based in holistic frame of reference
4. Development of teacher competency programs relating to core themes
5. Organizational rewards for core theme efforts and related delivery systems
6. Communication network made available to include:
    - EE materials
    - Classification of EE materials
    - Retrieval systems
7. Penetrate all societal sectors with EE
8. Involve key personnel in programs related to core themes
9. Make professional analysis of progress in EE an on-going national task.

Source: Ref. [3], pages 1.8 through 1.17.

TABLE 2

CORE THEMES

- Environmental Unity
- The General Systems Approach
- Energy Flow
- Economics
- Human Settlement

Source: Ref. [3], pages 3.22 to 3.32

THE "FAR WEST LABORATORY PROJECT"

Under a contract with the Office of Environmental Education of OE, the Far West Laboratory for Educational Research and Development has developed a set of environmental education teacher training models. Two of these models address Environmental Education with a special focus on energy; the others aim at fusion of Environmental Education (EE) with science and social studies. The two models that have special focus on energy are developed for two distinctively different target groups. The first is intended for high school teachers. The second model is aimed at community groups identified as leaders in fields of environmental concerns. The components of the models, their structure, and the approach to their design, however, are quite similar.

Each of the four models is presented in a separate document and the entire set is accompanied by a sourcebook for curriculum content. The models were designed to orient a variety of users to a systemic environmental education design process, but are primarily applicable for developers of teacher training curricula.

The TT Models Design Project is described here in two parts. First, organizing perspectives--that guided the design of the models--are identified. Second, a description of the models is presented.

Organizing Perspectives

The system concept constituted the core of the conceptualization of the models. Emerging from the mode of thought was a set of organizing perspectives that guided the design of the models. This set included:

- a holistic, transdiciplinary, and issue-focused view of environmental education curricula;
- a problem-solving and decision-making emphasis;
- a holistic approach to the design of the models;
- giving primacy to the learning-experience level (in the hierarchical complex of education); and
- considering teaching as a decision-making process.

First the core concept will be explained, followed by a characterization of the organizing perspectives.

The Core Concept: Synthetic Mode of Thought, a Holistic View

We are experiencing a transformation from the age of reductionism to the age of holism. Reductionism seeks to: (1) break down entities into their parts and (2) understand "whole" from the explanation of the behavior and characteristics of its parts.

Holism, on the other hand, holds that an entity has an existence other than the mere sum of its parts [4]. Holism has brought about a synthetic mode of thinking, as reductionism required the analytic mode. In holistic thinking, something to be examined is viewed as a component part of a larger system and is explained in terms of its role in the larger system [5].

A Holistic and Transdisciplinary View of Environmental Education Curriculum

A holistic and transdisciplinary view of EE curriculum leads us to integrate the findings of various disciplines, as we deal with areas of ever-increasing complexity, such as urbanization, energy and land use, the application of technology, economics and governance, and a host of social and environmental problems. These issues and problems are reflected in the interaction of the systems of man and nature, an interaction central to an understanding of environment-related problems. Environmental education, therefore, should clearly manifest the holistic view, and should aim at developing competence in the examination and articulation of the patterns of the interaction of parts which integrate into the whole. Such education will enable the individual to confront environmental issues from a perspective of wholeness, and to see the relationships between the various components of the systems of humanity and nature to which the problem is related.

A Problem-Focused and Decision-Making Orientation

Real environmental problems or issues are sufficiently broad in scope to have regional, national, or global significance. It should engage users in values clarification, problem-solving, planning, and decision-making processes which prepare them for dealing with environmental problems affecting both individual lifestyles and societal goals.

A Holistic View in the Design of the Model

As used here, the term "model" means an abstraction or a blueprint for something to be developed. A teacher-training model is, therefore, an abstraction or blueprint for a teacher-training program that can be developed based on the model. Thus, the outcome of the R&D program reported here was not a model program, but a model for environmental education teacher training.

In order to design a model based upon our understanding of the principles of operation and interaction within and between human and natural systems, it was necessary that the model be open-ended and readily revisable, since our understanding of these systems is incomplete and always changing. It was to be an adaptive model, building in a corrective way on the experiences accrued in its application.

The model must also display a spectrum of values and reveal their implications, consequences, and impacts in various energy and environmental contexts. This is the affective aspect of the model.

The model must also specify human capabilities required to engage effectively in decision-making and problem-solving. This property of the model relates to the human skills aspect.

Finally, a holistic view of design required that the model be constituted as a whole and incorporate and represent all the necessary and sufficient elements of a curriculum system. These elements will be described later.

The Learning-Experience Level is the Primary Level

Education is organized at four levels: institutional, administrational, instructional, and learning-experience. Holistic systems thinking [6] leads us to say that inasmuch as the learner is (or should be) the key entity of education, the learning-experience level should be the primary level in the system hierarchy of education.

Accordingly, the model has to address the notion that learning arrangements are designed around the learner (in this case the teacher, who is now the learner) in order to facilitate mastery of learning tasks.

Teaching as a Decision-Making Process

The organizing perspective of teaching as a decision-making process assigns the selection of instructional/learning arrangements as the significant function of teaching [7]. Within this process, the teacher considers and evaluates outcomes of alternative instructional/learning arrangements and selects those most likely to accomplish specific learning objectives. Based on an assessment of student needs and interests, the teacher, therefore, is actively involved in making decisions throughout purposing, planning, implementing, and evaluating EE curriculum and instruction.

A Description of the Models

The Environmental Education Teaching Training Models address comprehensively the purpose and goals of holistic environmental education, and transform these at the model level into components which represent specifications for the development of four teacher training programs.

The components which comprise the model and the manner in which they are developed respond to five major practioner/user-oriented inquiries that guided the design. These are:

Practitioner Questions	Relevant Model Components
• What do I need to know?	CONTENT SPECIFICATIONS
• What materials/resources do I need?	CONTENT SOURCEBOOK
• What instructional/learning arrangements are needed?	CURRICULUM MANAGEMENT SPECIFICATIONS
• What physical and logistical arrangements are needed?	IMPLEMENTATION MODEL
• What general guidelines can I use?	BEHAVIORAL AND CURRICULUM MODELS

The framework for designing these components is displayed next and is followed by brief descriptions of the components [8].

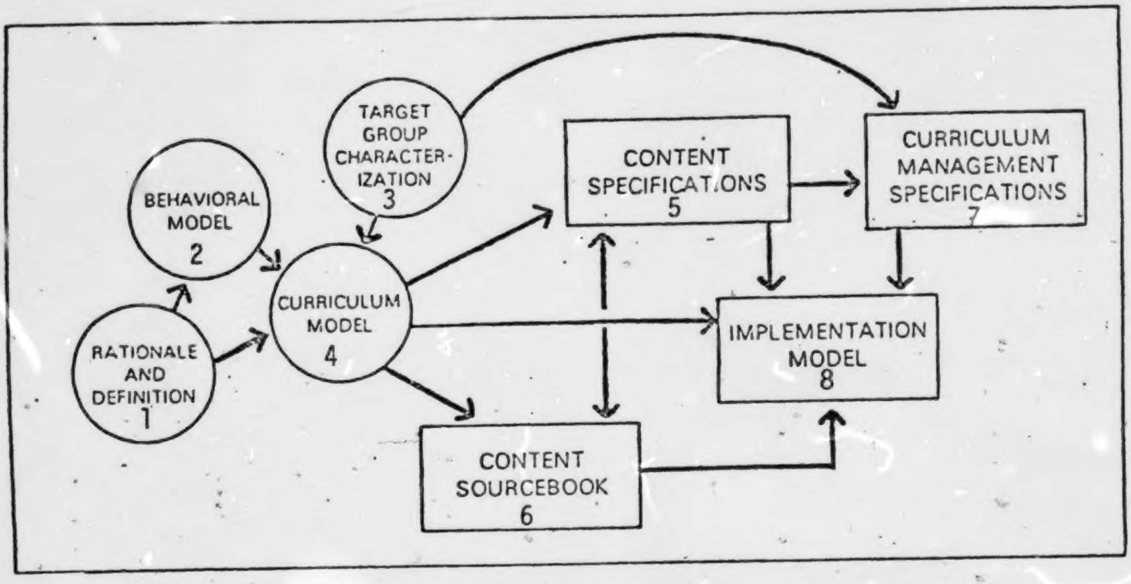
TARGET GROUP CHARACTERIZATION 3
BEHAVIORAL MODEL 2
CONTENT SPECIFICATIONS 5
CURRICULUM MANAGEMENT SPECIFICATIONS 7
CURRICULUM MODEL 4
RATIONALE AND DEFINITION 1
IMPLEMENTATION MODEL 8
CONTENT SOURCEBOOK 6

FIGURE 1
THE ENVIRONMENTAL EDUCATION
TEACHER TRAINING MODEL

1. The Rationale for and Definition of Environmental Education.

2. The Behavioral Model characterizes the general knowledge, skill, and attitide requirements which define the literate and competent environmental education teacher. It is derived from the Rationale.

3. The Target Group Characterization defines the target groups and provides a means to assess their current level of competence in order to ensure the model's compatibility with their needs.

4. The Curriculum Model provides an organized description of the various curriculum content domains within which potential teachers need to attain competence. It is consistent with the Rationale and represents an elaboration of the Behavioral Model and the Target Group Characterization.

5. The Content Specifications present the knowledge components for environmental education and a description of their instructional foci and purposes. These specifications were designed to satisfy requirements of the knowledge component of the Curriculum Model.

6. The Content Sourcebook presents an elaborated discussion of the knowledge components of the content model, a subject matter/cultural process matrix, an annotated resource bibliography and glossary. The requirements for the Sourcebook are defined by the Curriculum Model and Content Specifications.

7. The Curriculum Management Specifications provides general instructional arrangements which teachers can purpose, implement, and evaluate environmental education curriculum. This component was derived from and further elaborates the skills component of the Curriculum Model and Content Specifications.

8. The Implementation Model presents the conceptual bases and functions of the implementation process together with characteristic activities associated with each phase of the process. The implementation design was guided by the Curriculum Model.

The Curriculum Model

The curriculum model displays the major content components of one of the four models.

The curriculum model represents a curriculum content that emphasizes both the societal and individual dimensions of decision-making and their interrelationships; it identifies how these decisions can be made and interpreted from various world views. The use and conservation of environmental resources is approached from both the production and consumption points of view, as it relates both to the individual and to society.

Figure 2 specifies the components of the Curriculum Model and their linkages. These represent an ordered flow of concepts that build the complex configuration for comprehensive environmental education as necessary to inform decision-making.

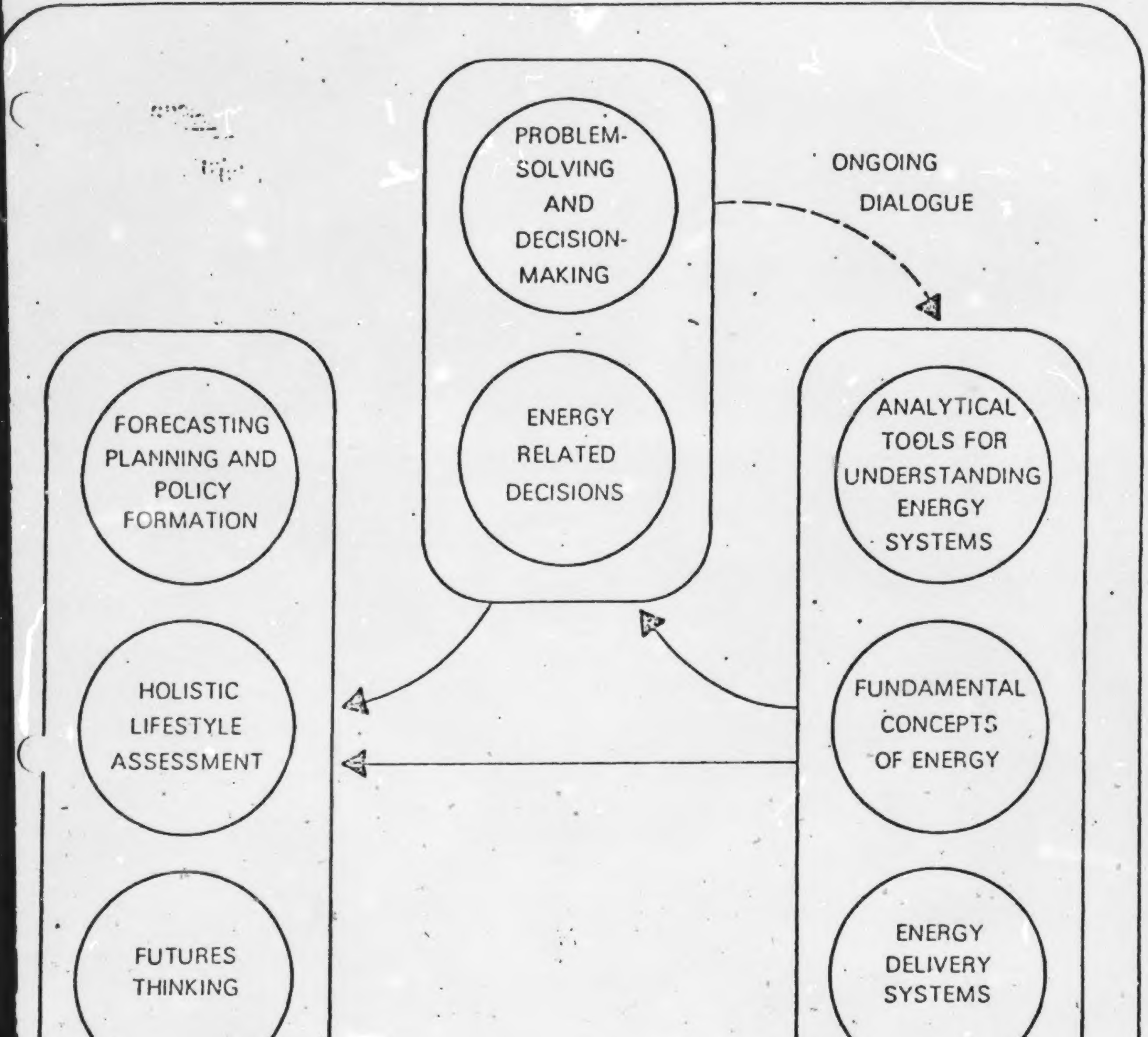
PROBLEM-SOLVING AND DECISION-MAKING
ENERGY RELATED DECISIONS
ONGOING DIALOGUE
FORECASTING PLANNING AND POLICY FORMATION
HOLISTIC LIFESTYLE ASSESSMENT
FUTURES THINKING
ANALYTICAL TOOLS FOR UNDERSTANDING ENERGY SYSTEMS
FUNDAMENTAL CONCEPTS OF ENERGY
ENERGY DELIVERY SYSTEMS

FIGURE 2

A CURRICULUM MODEL FOR ENVIRONMENTAL EDUCATION WITH SPECIAL FOCUS ON ENERGY

Detailed specifications for the major "knowledge," skills, and attitudinal components of the model are presented in the "Content Specifications" of the model.

Conclusion

What has emerged from this model-building work may be viewed as the model of an ideal system of environmental education teacher training. This model can be considered generic to a variety of operational models, which can be derived from the ideal system as specific constraints are introduced. Constraints include: level of present competence; level and kind of competence desired; accessibility of the target groups; time available for training; instructional/learning resources now available to mediate the content; resources available to support the additional development of instructional/learning resources; and institutional constraints on infusion/delivery. In view of all the above considerations, we can select various program configurations and design and develop operational programs.

In this paper, a model for the professional preparation of teachers in environmental education has been introduced. Environmental education should be a holistic, interdisciplinary effort. It will enable the individual to confront the environmental problems from a perspective of wholeness, and to see the relationships between the various components of the systems of humanity and nature as they relate to environmental problems or issues.

There is, in addition, an even broader implication of environmental education. It can provide an impetus and an experientia base for observing the interrelationship of knowledge and the way that knowledge expresses the real world. With appropriate reinforcement in other curriculum areas, we might enable learners to view holistically all aspects of their lives.

THE "UNIVERSITY OF VIRGINIA PROJECT"

The third contract to be discussed would be called the University of Virginia Consortium Project except for the unwieldiness of the name. Instead, it will be referred to as the UVA Project, the initials U-V-A being the common way in which the University of Virginia is identified in the local idiom.

The members of the consortium, at present, are:

- Battelle Memorial Institute,
  Columbus Laboratories
- University of Dayton
- University of Illinois
- University of Northern Iowa
- Vanderbilt University
- University of Virginia

The terms "members" and "consortium" simply mean that there are five organizations who are subcontracting to the University of Virginia, which serves as prime contractor to the OEE.

The activities of the consortium can be discussed under three headings:

- Analysis of past grant yields
- Development of a conceptual structure for environmental education
- Recommendations for the future of environmental education

These headings do not reflect precisely all of the work of the consortium, but they do represent the bulk of the effort.

Analysis of Past Grant Yields

For convenience of description, the name "yield" has been selected to refer to the collection of materials submitted from the grant project to OEE at the conclusion of the grant. Typically the yield will consist of a "final report" and, perhaps, a "product." Products sometimes take the form of a film, a video tape, a printed learning aid of some kind, a game, a set of slides accompanied by a teacher's guide, or a comic book stressing some environmental issue or concern.

During the period from FY-1971 through FY-1976, which is the period covered by the analysis, approximately 600 grants were awarded, and it is the yield from this collection of grants that is being analyzed.

The analysis ranges from simply developing an organized presentation that is adequate to describe the yield to categorization according to the anticipated (possible) target audience and according to what was made available to us from the grant.

The yields have been classified as of probable National, Regional, or Local interest. They have further been classified according to the mix of yield, to indicate whether a final report was received, whether a product was received, whether there were interim reports, and combinations of like descriptors.

The Office has been considering for some time what the best mechanism would be for making these analyses available for scrutiny by grantees and others. The decision as to the mechanism is conditioned on several legal and technical factors which will probably be resolved fairly soon.

Other results may also emanate from the analysis. It is possible to develop statistical information of a summary type, such as what percent of grantees failed to submit a final report, what percent of grantees developed videotapes, or what percent of grantees have made provision for dissemination of their yield to others, and how the grants were distributed among a variety of topical areas.

It will also be possible to compare the results of grant activity with other results developed in the project, as will be discussed in the next section.

Development of a Conceptual Structure (Definition) for Environmental Education

Have you ever tried to define "environmental education?" To do so may be very easy or extremely difficult, depending on what standards or purposes are set for doing it.

For purposes of program management and reporting, a short definition is sometimes totally inadequate. It is common for managers, both inside and outside of government, to be looking constantly for ways to distinguish one program from another; thus definitions of programs are needed that enable such distinctions to be made. There is also a need for detailed definition within a single program, to try to make sure that a balanced program evolves that does not pile up huge amounts of material in one sphere of the effort, but offers no opportunity for that material to move on into another part of the effort where the material might find applications. Likewise there is need for capacity to interact with a variety of publics in such a vital area as environmental education, and short definitions often do not provide adequate basis for effective discussion.

On the other hand, it is suprisingly uncommon to find respectable definitions that meet these needs. Efforts are underway now, as the result of initiatives from President Carter, to find better ways to describe programs to persons outside of government who need to interact with these programs.

One of the reasons for the difficulty lies in the complexity of the programs. Many programs do not have just one objective, or at least find it impossible to communicate effectively in terms of single objectives, and need an extensive amount of discussion to present what their program involves.

It is natural for people who want answers to questions about programs to seek simple answers, but this doesn't seem to be in the cards, in many instances.

A compromise that provides considerable organized detail as a way of defining a program, or a part of a program, and yet does make it possible to communicate about that program to someone who is willing to put in some effort to receive the communication (and not just lie inert and say "pump me full of the knowledge") involves the use of a structured graphic to present the definition. Examples of such graphics have been made available in a University of Dayton report [9]. The U-D report, while developed and presented by the University of Dayton staff, is not solely their product. It reflects a consortium effort, with substantial contributions coming from several, but not all, of the members of the consortium.

This report develops a normative map for environmental education. A normative map is, basically, a definition of what environmental education ought to be. As such, it naturally involves both technical and value judgments. Accordingly it's appropriate to state where these judgments came from. The answer to this question, without going into great detail, is that they came largely from the environmental education community, with the contributions of the UVA consortium being mostly limited to technical judgments.

The normative map represents the consortium's partial response to the primary recommendation in the Arizona report, and also to a need expressed by Walter Bogan as he reviewed the need for an effective way to characterize environmental education in terms of learning systems [10].

The map cannot stand alone as an effective communications device until sufficient study has been given to its construction to implant a good understanding of what is signifies. The U-D report contains an extensive presentation of the map, in which its basis, its graphical nature, the origins of its elements, and its several parts are clarified. This discussion will not be repeated here.

It is desired to take advantage of this Institute to carry out an exercise aimed at testing the comprehensiveness of the map, and possibly amending it later on to make it more fully representative of the views of the environmental education community. Also it will be possible to determine the extent to which the activities being carried out by the grantees who are attending the Institute are reflected on the map. For this purpose, the sheet titled "LOCATION AND LINKAGES" is appended. It is requested that all grantees become part of the exercise by filling out the sheet in conjunction with the map, and returning it to the UVA project director. This will make possible a detailed comparison of grant activity with activity portrayed on the normative map for the purposes mentioned.

The exercise stresses the aim of having the grantee consider where the grant activity fits in the "system" of environmental education, as portrayed by the map. It asks the grantee to consider what activity being carried out by others might be beneficial to the work of a particular grant, and also to consider what other activities might benefit from the work of your grant. Such consideration help establish the chain of interaction that is needed to make environmental education more effective.

Recommendations to be Developed

The third major area of activity in the UVA project involves the development of studied recommendations to OEE. At present it is thought that these will largely take the form of designs for learning systems. Of the three areas, this is the least developed, and work has barely begun in this area. Therefore a report on this activity will be foregone until the conceptual basis for the report has more adequately developed.

CONCLUSIONS

Environmental education benefits from a mix of grant and contract activity in OEE. The grants primarily reflect a variety of activities being carried out at many locations as a consequence of individual initiatives. The contracts primarily serve program needs that the grants cannot fill. Grant and contract activities can reinforce each other, and thereby strengthen the overall program.

LOCATION AND LINKAGES

1. My NAME is ____.

2. My GRANT YEAR is ____________________________________.

3. My GRANT TITLE (approximate) is ______________________

____.

4. My GRANT ACTIVITY appears to fall within that portion of the superstructure of the Big Map identified as (check one or more):

( ) Planning
( ) Learning Systems Design
( ) Personnel Development
( ) Learning Activities
( ) Learning Outcomes
( ) Delivery Systems and Support
( ) Evaluation
( ) None of these

If you checked "None of these", please explain:

____

____

____

____

____

5. My GRANT ACTIVITY most closely corresponds to the elements on the Big Map having the number(s): ____________________.

6. From those elements on the Big Map, my grant would MOST LIKELY HELP TO ACHIEVE, in a direct way, the elements numbered as follows: ____.

7. From those elements on the Big Map, my grant could most likely be directly helped by elements numbered as follows:

____.

NOTE 1: If you can't find suitable elements for items 6 and 7, please note on the back of this page elements that you think would be appropriate.

NOTE 2: Please return directly to John Warfield, or return to the Institute Office adjacent to the Plenary Room, by Wednesday.

NOTE 3: I hope to post results on Thursday.

REFERENCES

1. "Financial Assistance for Environmental Education Projects," Federal Register, Vol. 39, No. 99, May 21, 1974.

2. "Results of the BOULDER Consultation," a Report edited by Susan Lueck, Roy Littlejohn Associates, EE Consultation Project (available from Office of Environmental Education).

3. "Environment-Based Environmental Education: Inventory, Analysis, and Recommendations," a Report from the Center for Environmental Studies, Arizona State University, and Association of American Geographers, Contract No. OEC -74-8739, June 30, 1975.

4. Random House Dictionary of English Language.

5. Ackoff, R.L. Redesigning the Future. New York, N.Y.: John Wiley and Sons, 1977.

6. Banathy, B.H. "A Systems View of Organizing Education" in the Proceedings of the 1975 North American Annual Meeting of the Society for General Systems Research. . Washington, D.C.: Society for General Systems Research, 1975.

7. Berliner, D. To Develop an In-Service/Pre-Service Teacher Training Program Demonstrating the Adaptation of Research to Teaching. San Francisco, CA.: Far West Laboratory for Educational Research and Development, 1978.

9. "An Integration of Normative Models for Environmental Education," a report by Raymond Fitz, Joanne Troha, and Lorna Wallick, University of Dayton, Contract No. 300-700-4029, June 30, 1978.

10. "Redefining the Systems Space in Education: The Learning System Viewed at the Socio-Technical Boundary," a paper by Walter J. Bogan, Jr., presented at the 1977 Annual Meeting of the American Education Research Association.

APPENDIX B

THE SCIENTIFIC BACKGROUND FOR LEARNING LINKAGES

All available scientific evidence shows that people are ineffective in trying to deal with linkages unless the number is kept very low. By very low, we mean numbers such as 2, 3, or 4. When the numbers get much bigger, people cannot deal with them effectively without some kind of systematic assistance or process.

Most available scientific evidence indicates that once people master a set of linkages, and then begin to see that set of linkages as a single "chunk" of knowledge, they can then deal with it as a single element, and begin to establish new linkages with (perhaps) other chunks that also represent sets of linkages.

Experienced, respected scientists demonstrate constantly their own lack of sensitivity to linkages, but without identifying what the linkages mean -- either on the drawing or in the accompanying text. This is evidence of the difficulty facing the learner in environmental education.

The principal conclusion from the foregoing is that it is necessary to begin to establish a new way of dealing with linkages in the educational process.

The Piaget language for describing people who are attempting to learn linkages normally puts them into one of two classes:

> those engaged in formal operations and those who are in the concrete operations (or representational) stage.

Most people are not engaged in learning through formal operations, but learning with linkages very often involves formal operations.

To keep this report down in size, we shall not go through in detail all this scientific evidence. However, it is reported in detail in References 9 and 18.

Other relevant material relates to the distinction between left-brain and right-brain activity. It has been argued that one of the hemispheres lends itself naturally to formal operations, while the other is better attuned to grasping intuitively holistic patterns. However, no one has demonstrated that a good grasp of holistic patterns can be accrued without the kind of understanding of linkages that is stressed in the scientific literature.

APPENDIX C

THE SCIENTIFIC BACKGROUND FOR CURRICULUM DEVELOPMENT

(CONTENT AND PROCESS)

The scientific background for curriculum development indicates that parallel hierarchies are to be developed for all learning. The two parallel hierarchies represent

a) a content hierarchy

which shows the relationship among the components of the subject being studied in a particular learning situation, and

b) a process hierarchy

which shows the structure of the learning process through which the hierarchy of component concepts is to be mastered.

This background does not presume that there is a single way in which everything must be learned, or in which anything must be learned. What it does presume is that there should exist a logical structuring of the material to be learned and the way in which it is learned in order to make learning effective.

This theory is treated in Reference 9, Appendix A. What is not treated there, however, is a theory of how to make the curriculum development theory operational. It does not say how people should go about developing the hierarchies, nor how to bridge the gap from theory to the classroom.

If the curriculum development theory is put side by side with the theory of learning linkages, we readily draw this conclusion:

> a process of assistance to persons developing learning materials is required, in order to enable them to develop the hierarchies of content and process of learning for specific educational topics, so that they can present effective learning situations and materials for student learning.

A more radical conclusion, which deserves a thorough test, is that the processes should be used not so much by teachers as by learners themselves, with the teacher serving to manage the learning process. This is perfectly feasible with existing processes and computer software.

One further detail, which is important, and which seems to have escaped the literature of curriculum development, is the fact that the hierarchy is not the most general type of structure for developing learning materials or processes. The more general structure is called a multilevel structure. This structure contains the hierarchy as a special case where there is no feedback. A complete theory of development of multilevel structures is available in Reference 18.

APPENDIX D

Essence Statements for 1976 OEE Grants

1976 GRANT NUMBER	ESSENCE
1967	Destruction of Cincinnati Hillsides
1968	Materials Guides (2) on Hunger and on Population Growth
1969	Implications of natural gas shortages
1970	Teachers' guide for unified social studies/ science curriculum
1971	Curriculum materials on marine and coastal environments as related to human affairs
1972	Environmental newsletter and bibliography
1973	Energy workshop and economic development workshop relating to environmental limits
1974	Plans for building windmills; construction of environmental curriculum guide
1975	Workshop on integrated pest control
1976	Construction of mini-courses for secondary education on economics, pollution, population, sewage, and energy
1977	Development of land-use case studies
1978	Workshop on energy; curriculum outlines
1979	Seminar on downtown urban land use
1980	Alternatives for urban waste disposal
1981	The energy crisis
1982	Teacher resource kit on population
1983	Community symposium on environmental planning
1984	Community environmental source book giving references, environmental site locations, potential speakers; and construction of an ecological study area; and development of learning activity packages on soil, water, minerals, plants, animals, recreation.
1985	Training of local instructors; conference on energy awareness
1986	Simulation game development on the Burlington Dam Debate, societal impacts of flooding on the Souris River system

1976 GRANT NUMBER	ESSENCE
1987	Workshops on the coal industry; future of the industry in light of environmental concerns
1988	Workshops and workbook on water problems
1989	Town meetings on local environmental issues
1990	Workshop for instructors; games and activities aimed at developing positive student attitudes toward environmental quality and resource management
1991	School groups and Boy Scout groups working on linkages of community education with formal education; field trips and speakers; a linkage model for planning and carrying out cooperative community-school programs
1992	Workshops on introducing environmental education into the K-8 curriculum
1993	Workshop on environmental impact statements
1994	Classroom development of student awareness of current environmental problems followed by a wilderness survival campout to practice environmental skills
1995	Secondary school program involving values clarification techniques and their relevance to current environmental issues
1996	Workshops on environmental and economic concerns relating to the Coos Bay Estuary
1997	Consortium of St. Louis public schools with Missouri Botanical Gardens to help implement a basic environmental education program in the schools using the resources of the Gardens; production of a process guide for teacher training to carry out similar activities
1998	Workshops on environmental legislation with emphasis on lake water
1999	Community workshops on reclamation of oil fields

1976 GRANT NUMBER	ESSENCE
2000	Workshops on community growth and development in southwestern Utah, with emphasis on environmental impacts of energy development, resulting in policy statements for the 5 counties and the area
2001	Workshops along the Minnesota River to show environmental values of the River valley and effects of poor land use decisions
2002	Exploration of local land use problems with local farmers and with secondary students
2003	County level growth, explored through workshops on land use planning; workbook for community networking related to hard-rock mining in Montana
2004	Development of a college course on environmental issues and on problem solving
2013	Production of a one-hour documentary on the issues and ideas developed at the UN HABITAT conference; regional conference using resource material packets that supplement the film, to assess major human settlement problems
2015	Convocations to identify local problems in Micronesia; led to identification of oil pollution, population growth and distribution; and ecological disruption as related to rapid cultural change; ecosystem balance
2016	Interactions of land, energy, and water use in the Sioux Basin; Atlanta 2000 task forces on major issues; Issues in Prince George's County, Maryland; Development of simulation kits
2017	Workshop on "Jobs and Energy"; Booklet on "Guide to Employment Impact Statements"
2018	Innovative uses of recycled metals
2019	Classroom environmental education activities packets focused on both broad issues and on local county concerns.
2020	Curriculum guide related to the Haywood, CA shoreline
2021	Curriculum unit plans for middle school students; Community seminars on air and water quality and energy options

1976 GRANT NUMBER	ESSENCE
2022	Teacher awareness building; consulting sessions with teachers to encourage expanded environmental education activity; newsletter
2023	Library on energy; demonstrations of solar energy concepts
2024	Six one-hour television programs that simulate decision-making processes related to local energy needs and production; a study guide for use with courses for local college credit
2025	Six mini courses relating to environmental health in an ecological perspective; interactions of people with the environment
2026	Workshops to determine environmental education goals; student projects related to community problems including leaf composting, pollution, energy conservation, and lead testing
2027	In-service institute for teachers on the environment; ecology basics, environmental problems; evaluation; curriculum development skills
2028	Teacher orientation program; three 30-minute TV tapes dealing with solutions of hypothetical environmental problems
2029	Filmstrip and cassette sets for secondary environmental education based on such matters as energy interdependence and interaction, time pattern and human values, ecosystem, technology, thermodynamics, and systems
2030	Training of community coordinators to explain land-use planning in local meetings
2031	Workshops on problem assessment and environmental planning for Vermont
2032	In service training of teachers in basics of environmental education; teacher development of instructional objectives pursuant to Indiana environmental guidelines and design of relevant educational materials

1976 GRANT NUMBER	ESSENCE
2033	Case study showing how the San Antonio River was converted from a polluted eyesore and flood hazard to an environmental asset; developed in the form of a film
2034	Water resource management in an urban setting with emphasis on the Passaic River basin; experiences that will develop a decision-making perspective and a recognition of consequences were provided, and linked with governmental structure.
2035	Color films, study guides, and discussion kits related to increasing population and land use problems of New Hampshire
2036	Training packets for schools, contractors and home owners, and bankers relating to alternative energy sources and effective energy conservation in housing; used in teacher training and in presentations for professional home builders; design and construction of a passive solar greenhouse for study of food and energy issues and use in a local vocational program
2037	Statewide-oriented environmental education materials development; focus on Alabama environment, relate to specific problems; emphasize energy and resource depletion
2038	Awareness workshops relating to resource use, energy conservation, and land use planning
2039	Comparison of educational differences between a values-oriented and a non-values oriented instructional program; developed conclusion that process oriented texts lead to greater assimilation of factual knowledge than content-oriented texts
2040	In-service training of teachers on energy and pollution
2041	In-service training of teachers on basic terms in environmental education; multiplied by using high schoolers to teach elementary students; evaluation materials for use in classes
2042	Seminars, slide show, brochures, and data collection techniques for community leaders on preservation of open space in Texas

1976 GRANT NUMBER	ESSENCE
2043	Land use report dissemination to the community based on detailed studies of impacts of a local reservoir project.
2044	Symposia on effects of population change and redistribution upon the local environment in a Blue Ridge Mountain area
2045	Workshops on linkages between air and water quality concerns in town planning on public health in Essex County, MA
2046	Instruction in community history and in natural resource problems as a means of improving environmental conservation understanding
2047	Workshops to assess possible environmental impacts of state goals established through Idaho's Tomorrow
2048	Communications workbook and workshop to help citizens learn how to transmit their knowledge to legislators and to the general public. Power plant siting provided a case example.
2049	Summer institute to develop high school mini-courses concerning the need to solve environmental problems; community education project design
2050	Film, game, and teacher activity guide to show the complexity of environmental issues using electrical power as a vehicle; film titled "The Great Electric Power Puzzle"
2051	Development of resource materials package for use in public schools aimed at relating physical, biological, and cultural elements of the environment into coherent geographical systems.
2052	Workshop, clean water newsletter, and guide to protection of wetlands in New Hampshire; field workshops stressed land use planning, water quality management and solid waste management in the lakes region

1976 GRANT NUMBER	ESSENCE
2053	TV tapes to educate community on land use, population control, and changing economics in upper New York-St. Lawrence Seaway area
2054	Workshops on the alternatives of staying agricultural versus changing to a greater coal mining community in Wyoming Powder River Basin
2055	Workshop on declining natural gas supplies, based on a workbook.
2056	Workshop, curriculum guidelines, and energy conservation activity packets related to environmental and political resource materials; student activity in public hearings
2057	Citizen education in Pacific Northwest through workshops with emphasis on the Bonneville Hydro-Thermal Program and arrival of Alaska crude oil in the Puget Sound area
2058	In-service education and curriculum guide to emphasize the relation between food production and energy use and to show alternatives to energy-intensive food system practices; use of solar greenhouse to demonstrate efficient practices
2059	Pilot demonstration program dealing with pollution, land use, and energy in a simplified urban vernacular
2060	Film, teachers' manual and guide for low-income urban homeowners to enable them to reduce energy costs through weatherstripping (also produced in Spanish-language version)
2061	Seminars and a workshop to educate the Lowell, MA community on problems of solid waste disposal
2062	Forum and workshop on Connecticut water supply protection lands, relating to hydraulic, public health, legal, and economic significances; encouraging citizens to participate in the legislative processes
2064	Conference on impact of human actions on the environment; alternative behavior opportunities
2065	Trial of curriculum guide; community goals seminar

APPENDIX E

ESSENCE STATEMENTS

FOR 1971 GRANTS

1971 Grant Number	ESSENCE
4568	Workshop on leadership training, and preparation of bibliographies and resource lists
4569	Presented slide presentations, produced short radio & TV spots, provided pamphlets on mass media, and developed activity unit for elementary school use
4570	Bilingual newsletter on local environmental health
4571	None
4573	Community leadership training on environmental policy
4575	Environmental teacher center, involved field trips, classroom projects, cultivating a garden
4577	Community-wide environmental fair, booklet on basis for environmental awareness and concern, study of transportation and recycling involving student participation
4579	Development of master plan for EE in Colorado
4582	Secondary school student projects, with final reports prepared by students, intended to use as resources for lower level students
4583	Student projects involving videotapes, some student data collection on wind
4586	Community education on local water pollution, ecology coloring book for children, handbook on organic gardening
4587	Discussion guide for retreats, curriculum guide for grades 4-6, community meetings on land use
4588	Workshops to increase public officials' awareness of environmental impact of decisions, draft of state legislation on solid waste management
4589	Teaching guide for adult education classes
4590	Survey to determine environmental awareness, and to provide model for environmental data-gathering
4591	Community training program and manual on environmental deterioration and health and safety controls
4592	Help children discover transportation opportunities in Boston
4593	Lectures and seminars on environmental technology, Cataloging environmental problems of towns, and predicting future environmental problems

1971 Grant Number	ESSENCE
4594	Assessment of current state of environmental education in Massachusetts, recommendations for action in state EE programs
4596	Handbook for EE, grades K-4
4597	Promoting environmental awareness of college students through the visual and performing arts
4598	Promoting understanding of organic gardens
4599	Independent study of inner-city environment by minority youth, to identify environmental problems, with emphasis on employment, housing, and recreation
4601	Structured community dialog about urban neighboorhood, leadership development, initiation of action on some issues
4602	Stimulate community awareness through library expansion
4604	Development of state plan for EE in Minnesota
4606	Implement environmental studies in rural Missouri schools
4609	Increase local community awareness through systematic dissemination of materials and other facilitating activity
4610	Development and use of audio-visual materials for promoting EE awareness in New York area, 5-hour workshop-cruise on Staten Island Ferry
4617	Students produced films about their own urban environment
4618	Symposium on health and environmental problems
4619	8-week living and learning exercise, emphasizing energy sites, water quality testing, surveys of public, coyote food habits
4620	Introduction of ecology course in high school, design of curriculum guide, water testing, field trips, student presentations in community
4621	Development of EE curriculum materials for grades 1-8, emphasizing environmental issues
4622	Development of curriculum materials, training of instructors and demonstration of a model process
4623	Development of multidisciplinary study units for integration into courses
4624	Development of indoor and outdoor learning centers and awareness building
4626	None
4627	Workshops on environmental education

1971 Grant Number	ESSENCE
4628	Weeklong workshop for students, development of film on air pollution, community newsletter
4630	Development of new college course, presentations to other colleges, college student presentations in schools and in community action settings
4631	Citizen awareness of environmental problems, workshops, dissemination, field trips, and preparation of slide shows
4632	Experience-based course in environmental awareness for college students, involving co-teaching roles
4633	Use of a museum to offer short courses for school children, teachers, and parents, with nature walks, weekly science talks, and dissemination of environmental issue materials
4635	Curriculum units, college course on EE, and a book on educational systems design
4636	Developing citizen awareness of the pollution problems in Elk Creek
4638	Development of a state plan for EE in Texas
4639	Environmental awareness conference and training program, new approaches toward environmental decision making
4783	Traveling teams in vans giving environmental presentations and leading field trips for high schools
4572	Two week wilderness pack trip for "problem" children, followed by their activity in urban ecology projects, seacoast eco-studied, and a farm phase emphasizing farming techniques and carpentry skills
4574	Training conference on environmental techniques, and draft of Stanislaus County resource book
4576	Conversion of a vacant city block to an organic farm, followed by classes and tours using this resource
4578	Community awareness projects, development of a college course, development of a curriculum outline, and preparation of a book on ocean oriented industries.
4580	Summer training workshop for teachers, followed by introduction of multidisciplinary work in schools, along with community awareness effort relating to proposed mass transit subway route

1971 Grant Number	ESSENCE
4581	Development and school test of multi-disciplinary materials involving ethics, values, and attitude formation
4584	Videotaped lectures on the quality of life in Idaho were aimed at citizens to develop environmental awareness. A handbook was written to explain how to conduct lectures on environment
4585	Workshops for community leaders, conservation workshop for students, poster contest, slide-cassette set on environmental problems and EE handbook
4595	Development of a tenants' council, social center for recreation facility for teenagers and meeting place for senior citizens.
4600	Creative landscaping and greenhouse projects.
4603	In-service training workshop on school and outdoor sites for EE activities
4605	Neighborhood, library-based ecology centers; newsletter
4607	Development of one-year elementary ecology curriculum with volunteer instructors from the community. Included local wetlands, food chain, and animal life.
4608	Development of New York State plan for EE, involving development of local councils with State coordination
4611	Conversion of community-run recycling centers to educational centers for learning about solid waste and related problems
4612	Compilation of existing EE materials to make study units, teachers' guides on ecology, teacher orientation conference, and speakers' bureau
4613	Public awareness meetings on solid waste, landscaping, land use, and noise; 30 minute educational film.
4614	EE clearing house with training for volunteers and distribution of newsletter and other materials

1971 Grant Number	ESSENCE
4615	Cataloging environmental education activities in eleven counties, conference, workshop, slides, and tapes
4616	School and area beautification, bibliographies of EE materials, library development
4625	Pilot dissemination program of EE materials for teachers
4634	Developed environmental awareness in the community, distributed materials tailored to poverty areas and ecology
4637	Environmental awareness conferences
4782	College humanities class conducted community programs with emphasis on arts and crafts and conversion from wartime to peacetime economy
4829	Simulated congress on problems of Lake Erie, to explore pollution problems, goals and strategies for Lake Erie, and make recommendations on policy issues

APPENDIX F

ENVIRONMENTAL EDUCATION ACTIVITIES OF FEDERAL AGENCIES

The title of this Appendix is the same as the report [6], which this Appendix is intended to discuss.

The report was prepared in cooperation with the Subcommittee on Environmental Education of the Federal Interagency Committee on Education. The latter was established by Executive Order of the President in 1964, and operates under a revised Executive Order issued in 1974. The Subcommittee was established in 1975, with 17 federal government agencies represented at the initial meeting.

The Subcommittee does not operate programs, nor does it have a staff. Its work is done largely by members taking time from their regular jobs to serve the broad purpose of advancing the interests of environmental education.

This Appendix has been prepared to give the reader of this report a set of "essence statements" concerning the activities of the federal agencies in environmental education. We hope it will be understood that in trying to boil down these activities to a very short description, which might be read by a busy reader, it is necessary to abbreviate. The reader who finds these descriptions too curt can certainly refer to the original document [6] for further clarification and elaboration. The reader who is too busy to look for that document or to read it will, hopefully, benefit from these short descriptions.

It is our opinion, based on the essence statements, that most of the agencies mentioned who state that they are active in environmental education, are engaged in what we have called Types 2 and 3 (background and experiential, respectively). Their activities are generally related to their legally authorized missions. Most agencies report relatively little staff availability for their EE activities.

From the agencies mentioned other than OEE, we have been particularly impressed with the size and scope of the effort being carried out by the Tennessee Valley Authority, which devotes considerable staff resources to environmental education.

ESSENCE STATEMENTS

1. Council on Environmental Quality. Prepares an annual Environmental Quality Report for the President, and distributes results of its own studies.

2. Department of Agriculture-Extension Service. Has a long history of distinguished service to farmers. Emphasizes soil conservation, water conservation, land use, pest management, and waste management, while helping farmers stay solvent.

3. 4-H Youth Programs. Conducts educational projects with youth, in a variety of areas such as ecology and environment, air and climate, outdoors, geology and minerals, entomology, bees, conservation, forestry, wildlife, marine science and aquaculture. Learn-by-doing experiences helps develop practical skills and career awareness.

4. Department of Agriculture-Forest Service. Holds workshops and seminars and distributes pamphlets and data. Conducts Smokey Bear and Woodsy Owl programs, and is developing Grey Towers program on conservation. Encourages participation.

5. Department of Agriculture-Soil Conservation Service. Encourages environmental education. Provides help with materials and workshops. Emphasizes outdoor classrooms, soil and water conservation. Provides consulting assistance.

6. National Sea Grant Program. Provides grants to assist in improving wise use of ocean resources, including coastal zone management.

7. Office of Coastal Zone Management. Provides grants to states for coastal management programs, very limited educational efforts involving awareness guides, curriculum units, bibliographies and a one-term Coastal Studies curriculum combining government, ecology, and economics.

8. U. S. Army Corps of Engineers. Water resource development and evaluation of impact of such development on the environment. Provision of background information for public use.

9. Department of Energy. Curriculum materials, workshops, and exhibits relating to energy and environment. Energy extension service operating on a pilot basis in several states.

10. National Institute of Education. Collection and dissemination of findings of education R&D, and advancing education through application of education R&D. The ERIC Clearinghouse at Ohio State University indexes environmental education materials by subject, author, institution, and accession number. All indexed documents must be available in some way to a potential user. Also some information products are produced that are specifically directed to environmental education.

11. Center for Population Research. Supports research on the environmental effects of population change. Macro-economic analysis has been the primary tool for research on the environment.

12. National Institute of Environmental Health Sciences. Supports research on environmental health and supports research training. Support is for graduate students in universities.

13. Agriculture, Agribusiness, and Natural Resources Education. Distributes publications to states relating to natural resources, environmental protection, horticulture, and employment opportunities in environmental occupations.

14. Energy and Education Action Center. Coordinate Federal agency efforts in energy education and conservation to help other educational agencies, provide information and data on energy, facilitate technical assistance, exhibit resource materials, train people in energy areas, develop training programs for professionals, and develop curriculum materials involving the interrelationship of Energy, Environment and Engagement (sic).

15. Office of Environmental Education. Support the identification and exploration of locally perceived development needs, develop frameworks for dealing with environmental equality issues within the context of quality of life, and develop creative learning systems through which citizens can achieve environmental maturity of understanding and capacity for decision making.

16. Office of Population Affairs. Concerned with population education, which is presently a low-priority effort. Provides consulting assistance on population matters and advises federal agencies on population matters.

17. Department of Housing and Urban Development. Develops environmental standards, policies and procedures for energy conservation, codes modernization and administration, and strategies for amelioration of environmental problems including air and noise pollution. Land use and environmental management practices are emphasized. Makes available publications relating to land use.

18. Bureau of Indian Affairs. Trains Indian and Alaska Native people to manage their own affairs under the trust relationship to the Federal Government; operates several environmental education programs in schools.

19. Bureau of Land Management. Operates an environmental awareness program. Environmental assessments related to land use are fed into public land management endeavors. Trains Bureau employees in environmental education techniques and public affairs, and also provides training to others on a small scale.

20. U. S. Fish and Wildlife Service. Encourages teachers to begin environmental education programs. Stresses the enhancement of fish and wildlife and their habitat, for the benefit of people. Makes outdoor sites available for use by teachers. Makes available materials to help encourage teachers.

21. Geological Survey. Makes geological resource publications available.

22. National Park Service. Has emphasized site visits and overnite trips to landmarks. Also developed curriculum materials for grades K-8 stressing camps. Includes comparison of 2 different ecosystems with discussion of energy flows. Produces exhibits for public enlightenment.

23. National Institute of Law Enforcement and Criminal Justice. Disseminates findings on how the design and use of the built environment can lead to greater public safety, and on collective responsibility of citizens to create a more secure environment.

24. Department of Labor. Training to develop the employment potential of workers.

25. Agency for International Development. Efforts to upgrade environmental knowledge of AID officials. Sponsorship of courses related to environmental management in developing or less developed countries. Arid Lands Information System establishment.

26. Directorate for UNESCO Affairs, Department of State. Develop, articulate, and implement U. S. policy toward UNESCO, concerning U. S. policy on environmental education.

27. U. S. National Commission for UNESCO. Preparation of U. S. government position papers on environmental education.

28. Federal Aviation Administration. Works with private industry to help achieve policy established by EPA and CEQ. Prepares a five-year plan on environmental activity of FAA.

29. Federal Highway Administration. Conducts R&D related to environmental impacts of highway transportation.

30. ACTION. Seeks to strengthen and supplement efforts to eliminate poverty and poverty-related environmental problems. Activities related to the environment are carried out on an as-proposed basis under the various programs of ACTION, such as VISTA and the Peace Corps.

31. Appalachian Regional Commission. Has supported environmental education activities through curriculum development, higher education teacher training, adult education, career building, joint programs with the private sector, and public information in environmental education.

32. Community Services Administration. Carriers out consumer education on utility rate structures and reform and on alternative energy technologies.

33. Environmental Protection Agency. Mainly provides career-related learning programs to ensure that personnel are available to work on abatement and control of pollution. Offers classes at the EPA Visitor Center to show what EPA is doing and what others can do to protect the environment. Provides speakers on the environment, environmental films, pamphlets, and direct training programs in specialized areas at appropriate locations.

34. Interstate Commission on the Potomac River Basin. Prepares and disseminates issue papers on the Potomac River Basin, conducts field trips to drive home the issues, and seeks to promote efforts to assure the environmental integrity of the Basin.

35. National Aeronautics and Space Administration. Provides publications, films, and master teachers to assist schools to relate to new tools and findings from NASA's Earth observation programs. Maintains an extensive resource pool for local use.

36. National Endowment for the Humanities. Makes some grants that deal principally or partially with environmental questions.

37. National Science Foundation. Provides grant support for projects that relate to environmental education, mostly on specialized subjects.

38. Small Business Administration. Measures impact of pollution and several regulatory programs upon small business.

39. Smithsonian Institution. Carries out studies at the Chesapeake Bay Center to improve quality and effectiveness of environmental education, and to convey current environmental research findings to the public. Emphasizes field trips. Provides some curriculum development, summer training, some exhibits, some research studies, and some dissemination. Expenditures/are 0.1% of total Smithsonian annual expenditures. on environmental education

40. Tennessee Valley Authority. Uses the Land Between the Lakes area to provide outdoor environmental education, in cooperation with schools. Provides assistance to teachers with programming. Develops new outdoor facilities such as Silo Overlook, and a trail system. Continues to expand into other areas beyond the original focus, relating to regional consortia, with plans continuing through 1985. Uses extensive demonstration facilities. Though a large program, involving nine professionals and twelve technical aides, it has never undergone a major external evaluation. TVA is now developing a network of university centers along with other activities to extend its environmental education activities.

41. United States Water Resources Council. Has no responsibility for environmental education. Coordinates water resources policy matters within the Executive Branch of the Federal Government.

42. Veterans Administration. Has no mandate in environmental education, but has an impact on environmental protection and energy conservation because of its huge program involving hospitals, plants, and other buildings, and because it supports the training of so many veterans.

43. Subcommittee on Environmental Education of the Federal Interagency Committee on Education. While having no staff, this subcommittee draws on members of various agencies for its work. It prepared a 19-page booklet titled "Fundamentals of Environmental Education" which was widely disseminated. The Subcommittee seeks to use this booklet as a "basis for identifying duplication and gaps in environmental education activities of federal agencies." The Subcommittee also has participated extensively in the UNESCO activities, and arranged for the publication of the report "Environmental Activities of Federal Agencies" (which this present paper is summarizing through these essence statements). Develops specific initiatives, and seeks to improve coordination of environmental education among federal agencies and to develop recommendations on federal policy and programs in environmental education.

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School of Engineering and Applied Science

The University of Virginia's School of Engineering and Applied Science has an undergraduate enrollment of approximately 1,300 students with a graduate enrollment of approximately 500. There are 125 faculty members, a majority of whom conduct research in addition to teaching.

Research is an integral part of the educational program and interests parallel academic specialties. These range from the classical engineering departments of Chemical, Civil, Electrical, and Mechanical and Aerospace to departments of Biomedical Engineering, Engineering Science and Systems, Materials Science, Nuclear Engineering and Engineering Physics, and Applied Mathematics and Computer Science. In addition to these departments, there are interdepartmental groups in the areas of Automatic Controls and Applied Mechanics. All departments offer the doctorate; the Biomedical and Materials Science Departments grant only graduate degrees.

The School of Engineering and Applied Science is an integral part of the University (approximately 1,530 full-time faculty with a total enrollment of about 16,000 full-time students), which also has professional schools of Architecture, Law, Medicine, Commerce, and Business Administration. In addition, the College of Arts and Sciences houses departments of Mathematics, Physics, Chemistry and others relevant to the engineering research program. This University community provides opportunities for interdisciplinary work in pursuit of the basic goals of education, research, and public service.